

FLOOD INSURANCE STUDY



ADAMS COUNTY, INDIANA AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
ADAMS COUNTY	18001C
ADAMS COUNTY UNINCORPORATED AREAS	180424
DECATUR, CITY OF	180001
BERNE, CITY OF	180485
GENEVA, TOWN OF	180002
MONROE, TOWN OF	



REVISED:



Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
18001CV001B

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Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. Please contact the Community Map Repository for any additional data.

The Federal Emergency Management Agency (FEMA) may revise and republish part or all of this FIS report at any time. In addition, FEMA may revise part of this FIS report by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS report. Therefore, users should consult with community officials and check the Community Map Repository to obtain the most current FIS report components.

Effective Date: To be determined

Revised Date: October 16, 2003

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FLOOD INSURANCE STUDY

ADAMS COUNTY, INDIANA AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and supersedes the FIS reports and Flood Insurance Rate Maps (FIRMs) in the geographic area of Adams County, Indiana, including the City of Berne, the City of Decatur, the Town of Geneva, the Town of Monroe, and the unincorporated areas of Adams County (hereinafter referred to collectively as Adams County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. This information will also be used by Adams County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

The Digital Flood Insurance Rate Map (DFIRM) and FIS report for this countywide study have been produced in digital format. Flood hazard information was converted to meet the Federal Emergency Management Agency (FEMA) DFIRM database specifications and Geographic Information System (GIS) format requirements. The flood hazard information was created and is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

Information on the authority and acknowledgements for each of the new studies and previously printed FIS reports and Flood Insurance Rate Maps (FIRMs) for communities within Adams County was compiled and is shown below:

Adams County the previously effective countywide FIS for Adams County is dated October 16, 2003. The hydraulic and hydrologic analyses were submitted by Christopher B. Burke Engineering, Ltd., on behalf of the Indiana Department of Natural Resources (IDNR) and the Maumee River Basin Commission (MRBC) for the Federal Emergency Management Agency (FEMA).

Adams County
(Unincorporated Areas): the hydrologic and hydraulic analyses for the FIS report dated February 3, 1981, were prepared by the U.S. Army Corps of Engineers (USACE), Detroit District, for the Federal Insurance Administration (FIA), under Inter-Agency Agreement No. IAA-H-10-77, Project Order No. 15, amended by Amendments No. 7 and No. 10. That work was completed in October 1979.

Decatur, City of: the hydrologic and hydraulic analyses for the FIS report dated January 2, 1981, were prepared by the USACE, Detroit District, under Inter-Agency Agreement No. IAA-H-10-77, Project Order No. 15, amended by Amendment No. 7. That work was completed in August 1979.

Geneva, Town of: the hydrologic and hydraulic analyses for the FIS report dated May 1, 1984, were obtained from the FIS report dated February 3, 1981, for Adams County, Indiana (Unincorporated Areas) for the St. Marys River, Blue Creek, and Yellow Creek.

New Studies: The hydrologic and hydraulic analysis for new detailed, leverage and approximate stream reaches of Adams County were performed by Christopher B. Burke Engineering, Ltd., on behalf of the Indiana Department of Natural Resources and the Maumee River Basin Commission (MRBC). The Indiana Department of Natural Resources managed the production of this study as part of their Cooperating Technical Partner agreement with the Federal Emergency Management Agency dated April 29, 2004, which was defined by the Indiana DNR Mapping Activity Statement 05-01 dated June 23, 2005.

Redelineation of the previously effective flood hazard information for this FIS report was performed by Christopher B. Burke Engineering, Ltd., on behalf of the Indiana Department of Natural Resources. Correction to the North American Vertical Datum of 1988 and conversion of the unincorporated and incorporated areas of Adams County into the countywide format was performed by the Indiana Department of Natural Resources. The Indiana Department of Natural Resources managed the production of this study as part of their Cooperating Technical Partner agreement with the Federal Emergency Management Agency dated April 29, 2004, which was defined by the Indiana DNR Mapping Activity Statement 05-01 dated June 23, 2005 and funded under agreement number EMC-2005-GR-7022.

The coordinate system used for the production of the digital FIRMs in the Transverse Mercator projection, Indiana State Plane coordinate system, East Zone, referenced to the North American Datum of 1983 and the GRS 1980 spheroid.

1.3 Coordination

The purpose of an initial Consultation Coordinated Officer's (CCO's) meeting is to discuss the scope of the FIS. A final CCO meeting is held to review the results of the study. The dates of the initial and final CCO meetings held for the previously effective FIS reports covering the geographic area of Adams County, Indiana are shown in Table 1 (References 1-2). The initial and final CCO meetings were attended by the study contractor, FEMA (or the Federal Insurance Administration), the Indiana Department of Natural Resources (IDNR), and the affected communities.

Table 1: CCO Meeting Dates for Pre-Countywide FIS

<u>Community Name</u>	<u>Initial CCO Date</u>	<u>Final CCO Date</u>
Adams County (countywide)		November 28, 2001
Adams County (Unincorporated Areas)	August 31, 1976	August 20, 1980
Decatur, City of	August 31, 1976	August 29, 1980
Geneva, Town of	*	October 12, 1983

*Data not available

For this countywide FIS, an initial CCO meeting was held on February 8, 2005, and was attended by IDNR, MRBC, and representatives from the City of Decatur and Adams County.

The results of the countywide study were reviewed at the final CCO meeting, attended by representatives of FEMA, IDNR, MRBC and representatives from incorporated communities, and unincorporated areas of Adams County. All problems raised at that meeting were addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Adams County, Indiana, including the incorporated communities listed in Section 1.1

All FIRM panels for Adams County have been revised, updated, and republished in countywide format as a part of this FIS. The FIRM panel index, provided as Exhibit 2, illustrates the revised FIRM panel layout.

Approximate methods of analysis were used to study those areas having a low development potential or minimal flood hazards as identified during the initial CCO meeting. For this study, 8 new stream reaches were studied using approximate methods. The scope and methods of new approximate studies were proposed and agreed upon by FEMA, IDNR, MRBC, Adams County and the City of Decatur.

Streams studied by detailed methods include the St. Marys River, which was done as a leverage study through the MRBC.

Selected reaches of streams that have been studied by detailed methods were selected for redelineation based on detailed topography. Holthouse Ditch was selected for redelineation.

This FIS update also incorporates the determination of letters issued by FEMA resulting in map changes (Letters of Map Change, or LOMCs). No Letters of Map Revision (LOMRs) have been issued for Adams County. Letters of Map Amendment (LOMAs) incorporated for this study are summarized in the Summary of Map Actions (SOMA) included in the Technical Support Data Notebook (TSDN) associated with this FIS update. Copies of the TSDN may be obtained from the Community Map Repository.

Table 2: Streams Studied by Detailed Methods

Blue Creek	Loblolly Creek
Borum Run	Limberlost Creek
Holthouse Ditch	St. Marys River
Koos Ditch	Wabash River
Kohne Drain No 1	Yellow Creek

Table 3: Streams Studied by Redelineation Methods

Holthouse Ditch

Table 4: Streams Studied by Approximate Methods

Anderson Ditch	Leichty Ditch
Aspy Ditch	Limberlost Creek
Ayers Ditch	Little Blue Creek
Barr Ditch	Loblolly Creek
Blair Ditch	Martz Creek
Blue Creek	Meyer Ditch
Bluhm Ditch	Moser Ditch
Borum Run	Ohler Ditch
Breiner Joint Ditch	Rice Ditch
Brewster Ditch	Roth Ditch
Egley Ditch	Saint Marys River
Engle Ditch	Schugg Ditch
Flatrock Creek	Selking Ditch
Fuch Ditch	Shoemaker Ditch
Gates Ditch	Smith Ditch
Gerke Ditch	Smith Shoemaker Ditch
Glendenning Ditch	Sullivan Ditch
Habegger Ditch	Swartz Ditch
Hahnert Ditch	Threemile Creek
Hendricks Ditch	Twentyseven Mile Creek
Holthouse Ditch	Wabash River
Jamstutz Ditch	Weber Ditch
Kohne Number One Ditch	Wittmer Number One Ditch
Koos Ditch	Yellow Creek

Table 5: Scope of Study

<u>Stream</u>	<u>Limits of Leverage Study</u>
St. Marys River	Allen – Adams County line to Ohio State line
<u>Stream</u>	<u>Limits of Redelineation Study</u>
Holthouse Ditch	confluence to County Road 34 West
<u>Stream</u>	<u>Limits of Approximate Study</u>
Blue Creek	end of detailed study to CR 39 West crossing
Borum Run	County Road 9 South to County Road 36 West
Brewster Ditch	confluence to County Road 23 South
Fuch Ditch	confluence with Blue Creek to CR 16 South crossing
Gates Ditch	confluence with Blue Creek to mouth of Habegger Ditch
Habegger Ditch	confluence with Gates Ditch to CR 35 West crossing
Holthouse Ditch	County Road 35 West to County Road 9 South
Martz Creek	Mouth to County Road 31 West
Wabash River	Wells – Adams County line to State Road 218, and County Road 37 West to US 27, and County Road 32 to Adams – Jay County line
Yellow Creek	County Road 10 ½ to County Road 30 West

2.2 Community Description

Adams County is located in the northeastern Indiana. It is bordered on the north by Allen County, Indiana on the east by the counties of Van Wert, Ohio, and Mercer, Ohio; on the south by Jay county, Indiana; and on the west by Wells county, Indiana. The nearest large city is Fort Wayne, Indiana, which is approximately 15 miles north of Adams County. Indianapolis is approximately 100 miles to the southeast. Adams County has an area of 332 square miles, not including the city of Decatur. Adams County was organized in 1836 and Decatur was made the County seat. The population of Adams County has increased from 11,382 in 1870 to 26,871 in 1970 to 33,625 in 2000 (U.S Department of Commerce, 2000 Census of Population).

The average annual temperature is 50.3 degrees Fahrenheit (F). Extremes in average monthly temperatures range from 20.2 F in January to 72.5 F in august. Precipitation averages 34.27 inches a year with the wettest month being June, with 4.17 inches. Snowfall averages 28.7 inches per year. The driest month is December, with 2.09 inches (Chamber of Commerce, 1979)

Adams County is almost entirely agricultural. Other land use categories such as residential, commercial, institutional, and industrial are located primarily in the fringe areas outside of the city of Decatur and in small towns which dot the county (Chamber of Commerce, 1979). The soil in Adams County is primarily poorly to

very poorly drained, clayey glacial till of the Blount-Pewamo Association. The nearly flat terrain slopes off into well-drained outwash and alluvial sand and silt deposits (U.S Department of Agriculture, 1971).

The floodplain land use near the communities of Decatur, Linn Grove, and Geneva is comprised of approximately 95% farmland and about 5% forestlands and wetlands. In the community of Linn Grove, some of the lands are parklands, while a small portion of the floodplain near Geneva is used for industrial purpose.

The City of Berne is located at the intersection of US Highway 27 and State Road 218 in south central Adams County. According to STATS Indiana, the 2000 population of Berne was 4,150.

The Town of Monroe is located along State Road 124, just east of US Highway 27 and in central Adams County. According to STATS Indiana, the 2000 population of Monroe was 734.

2.3 Principal Flood Problems

Flooding generally occurs during December through June and usually caused by excessive rainfall with snowmelt as a contributing factor. During the floods on the St. Marys River and the Wabash River in March 1978, snowmelt played a major role. Water equivalents over the basin were estimated at five to six inches, with saturated soil conditions because of a previous flood in December 1977. The St. Mary's River reached an apparent crest of 10,900 cubic feet per second (cfs) on March 14 at the USGS gaging station at Decatur. The Wabash River reached a peak discharge of 9,560 cfs on March 17 at the USGS gaging station at Linn Grove. The estimated return periods for both floods were greater than the 10-year flood but less than the 25-year flood.

The greatest floods on both the St. Mary's River and the Wabash River occurred in July 2003 and March 1913. Flood crest stages of 26.94 feet and 26.5 feet, referenced to present gage datum, were recorded on the St. Mary's River at Decatur in July 2003 and March 1913, respectively. At the Decatur gage, the recorded peak discharge for the July 2003 flood was 15,000 cubic feet per second (cfs) and above to the 100-year discharge, but there is no estimated peak discharge for the March 1913 flood. The Wabash River had a crest stage of 14.76 feet at the Linn Grove gage, with a corresponding peak flow of 14,500 cfs, which is greater than the 200-year discharge. There is no estimated peak stage or discharge for the March 1913 flood near the Linn Grove gage.

The next four greatest floods stages recorded since 1932 on the St. Marys River at Decatur, occurred on March 14, 1982; February 25, 1985; January 14, 2005; and February 10, 1959. Respective discharges were 10,900 cfs, 10,300 cfs, 11,300 cfs, 10,800 cfs (USGS, Water Resources data for Indiana). The estimated return periods

for floods of these magnitudes range from more than 10 years to less than 25 years. Areas which often flood along the St. Mary's River are parklands, low laying areas, and secondary roads and some county roads, particularly near the east and southeast of the city of Decatur. Larger floods have caused flooding on Ogg Street and many city streets. Stratton Park, a subdivision of Decatur, becomes an island. Additional flooding is caused in the smaller tributaries due to water from the St. Mary's river backing up into them extensively.

The USGS gage on the Wabash River at Linn Grove has been in operation since September 1964. In the period of record at the gage, the greatest flood recorded was the July 2003 flood mentioned above. Areas which flood often along the Wabash River include low-laying areas, cropland, parks and some secondary roads. Floods with return period with 100 years have the potential to cause property damage in the southern and eastern ends of the city of Geneva and on the east side of the community of Linn Grove.

Flooding problems along the St. Marys River, the Wabash River, and smaller tributary streams are intensified by heavy brush, trees, and other materials along the riverbanks. Numerous bridges and culverts on the smaller streams restrict flow to some degree and collect debris which impedes efficient discharge of floodwaters. This is particularly true of Kohne Ditch No. 1, where numerous roadway crossings cause significant backwater effects. During periods of cold weather, ice will form and will aggravate flooding if rapid runoff occurs.

2.4 Flood Protection Measures

Adams County has adopted zoning ordinances which regulate the use of land in the floodplain. The City of Decatur Zoning Ordinance (1978) and the Adams County Zoning Ordinance (October 19, 1966) regulate development within the floodplain.

No information on flood protection measures in the Town of Geneva is available.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this FIS. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases

when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1-percent chance of annual exceedance) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the county at the time of completion of this FIS. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding sources studied in detail affecting the county.

Precountywide Analyses

The City of Decatur, the Town of Geneva, and the unincorporated areas of Adams County have a previously printed FIS report. The hydrologic analyses described in those reports have been compiled and are summarized below.

For the St. Marys River and the Wabash River, discharge values developed for the 10-, 50-, 100-, and 500-year flood peaks were determined according to U.S. Water Resources Bulletin No. 17A, Guidelines for Determining Flood Flow Frequency utilizing the log-Pearson Type III methods (U.S. Water Resources Council, 1977). A regional generalized skew coefficient of -0.2 was used. Flood frequencies on the St. Marys River were based upon 44 years of record at the USGS gage (No. 04181500) at Decatur. Flood frequencies on the Wabash River at Linn Grove were based on a correlation between the USGS gages in Bluffton and Linn Grove. The gage in Bluffton (No. 03323000) had 70 years of record and the gage in Linn Grove (No. 03322900) had 13 years of record. Flood frequencies on the Wabash River at Geneva were interpreted between the Linn Grove gage and the USGS gage at New Corydon which had 27 years of record.

To determine the discharges for the ungaged streams, Holthouse Ditch, Borum Run, Koos Ditch, Kohne Drain No. 1, Limberlost Creek, and Loblolly Creek, a regional discharge-drainage area relationship was developed using existing gage records in this region. Procedures were outlined in Bulletin No. 17A, Guidelines for Determining Flood Flow Frequency (U.S. Water Resources Council, 1977). Discharges for the ungaged streams, Kohne Drain No. 1 and Koos Ditch were developed using synthetic hydrographs (U.S. Department of the Interior, 1960). Drainage area, main channel slope, type of soil, and land use were parameters used in the study.

Countywide Analyses

Information on the methods used to determine peak discharge-frequency relationships for the streams restudied as part of this countywide FIS is shown below.

The source for the peak discharge input to the models was the Indiana Department of Natural Resources (IDNR) “Coordinated Discharges.” The IDNR “Coordinated Discharges” are Discharge (cfs) versus Drainage Area (sq. mi.) relationships that have been reviewed and approved by the USGS, NRCS, and IDNR. A plot of Discharge (cfs) versus Drainage Area (sq. mi.) was developed by IDNR for the subject study reaches based on both the gaging stations analyses and HEC-1 models prepared in the early stages of the MRBC watershed modeling efforts. The plot was used to determine flood flows at desired locations along the stream.

A summary of the drainage area-peak discharge relationships for all the streams studied by detailed methods is shown in Table 6, “Summary of Discharges.”

Table 6 – Summary of Discharges

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10-YEAR</u>	<u>50-YEAR</u>	<u>100-YEAR</u>	<u>500-YEAR</u>
BLUE CREEK					
Just upstream of mouth	81.8	2,000	*	3,150	*
Upstream of Luginbill Creek	52.7	1,450	*	2,325	*
Approximately 0.2 mile downstream of County Road 200 East	24.4	800	*	1,300	*
BORUM RUN					
At confluence with the St. Marys River	14.6	960	1,260	1,390	1,695
HOLTHOUSE DITCH					
At confluence with the St. Marys River	34.5	1,680	2,200	2,440	2,950
KOHNE DRAIN No. 1					
At confluence with Holthouse Ditch	2.5	320	425	470	585
KOOS DITCH					
At confluence with the St. Marys River	3.5	370	490	545	660
LIMBERLOST CREEK					
At confluence with Loblolly Creek	41.7	1,900	2,500	2,760	3,350

Table 6 – Summary of Discharges (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-YEAR	50-YEAR	100-YEAR	500-YEAR
LOBLOLLY CREEK					
At confluence with the Wabash River	110	3,600	4,700	5,200	6,300
Upstream of confluence with Limberlost Creek	67.2	2,600	3,400	3,800	4,600
ST. MARYS RIVER					
Downstream of confluence with Buhlman Ditch	686	9,800	*	14,900	*
At USGS gage	621	9,400	*	14,500	*
Upstream of confluence with Yellow Creek	564	9,100	*	14,300	*
Upstream of confluence with Blue Creek	467	6,500	*	10,500	*
WABASH RIVER					
At USGS gage near Linn Grove Road	453	8,800	12,200	13,600	16,900
Downstream of Highway 27	420	8,400	11,700	13,100	16,500
Upstream of confluence with Loblolly Creek	296	6,900	9,750	10,900	13,800
YELLOW CREEK					
Just upstream of mouth	27.1	840	*	1,375	*

*Data not available

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the source studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. For construction and/or floodplain management purposes, users are encouraged to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

Cross sections were determined from topographic maps and field surveys. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry. All topographic mapping used to determine cross sections is referenced in Section 4.1.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the FIRM.

The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Precountywide Analyses

The City of Decatur, the Town of Geneva, and the unincorporated areas of Adams County have a previously printed FIS report. The hydraulic analyses described in those reports have been compiled and are summarized below.

Cross sections for the backwater analyses of the St. Marys River, Borum Run, Kohne Drain No. 1, Koos Ditch, Holthouse Ditch, the Wabash River, and the tributaries were taken from field surveys by the USACE. All bridges, culverts, and dams were field checked to obtain elevation data and structural geometry.

Channel roughness factors (Manning's "n") used in the hydraulic computations were based on field observation, examination of aerial photographic coverage (Air Maps Inc., 1974) and, in the case of St. Marys River, the analysis of high water marks of the July 2003 flood. Channel roughness values range from 0.037 to 0.049 on the St. Marys and Wabash Rivers, and from 0.04 to 0.10 for the overbank areas. Channel roughness values on all other streams were estimated to range from 0.02 to 0.07 and overbank roughness values range from 0.035 to 0.12.

Starting water-surface elevations were calculated using the slope/area method. Water-surface elevations of floods of the selected recurrence intervals were computed through use of the USACE HEC-2 step-backwater computer program (USACE, 1976). Flood profiles were drawn showing the computed water-surface elevations for the floods of the selected recurrence intervals (Exhibit 1).

The analysis of the St. Marys River at the northern corporate limits of Decatur contains a routing sequence to split the flow at the U.S. Route 27 and CONRAIL crossings with the major portion following the main stream and a portion routed to the north of the stream.

The detailed analysis of Borum Run extends from the mouth to the Decatur corporate limit, approximately 2,500 feet upstream of the Norfolk Western bridge. Upstream of the Decatur corporate limit, Borum Run was studied as St. Marys River backwater. The St. Marys River backwater elevations for the 10- and 50-year floods were found to cause no flood hazard upstream of Decatur along Borum Run.

The portions of the St. Marys River and the Wabash River studied by approximate methods were obtained from the Adams County Flood Hazard Boundary Map (U.S.

Department of Housing and Urban Development, 1978). For the tributary streams studied by approximate methods, the elevations of the 100-year flood were developed from normal depth calculations at selected cross-section locations.

Countywide Analyses

Information on the methods used to determine peak discharge-frequency relationships for the streams restudied as part of this countywide FIS is shown below.

The HEC-2 computer program developed by the USACE was used to compute water-surface profiles (USACE, 1991). Cross sections used in the analysis were obtained from field survey and existing HEC-2 FIS models. The cross-section data was duplicated and revised as required. Cross-section numbers were revised to reflect river miles. Field data was entered into the model and cross sections were generated and checked for accuracy against the field data. For the new leverage and approximate study reaches, the USACE HEC-RAS program was used. HEC-RAS is an updated version of the HEC-2 program used to perform step-backwater analyses.

Flood profiles were prepared for all streams studied by detailed methods and show computed water-surface elevations to an accuracy of 0.5 feet for floods of the selected recurrence intervals. For this countywide FIS, flood profiles and approved LOMRs have been consolidated into continuous stream reaches and adjusted to reflect the current vertical datum as described in Section 3.3. New profiles have been prepared for the new detailed studies and for the purposes of incorporating the LOMRs described in Section 2.1 above.

The starting water-surface elevations for the St. Marys River upstream of Trier Ditch were taken from the USACE HEC-2 model developed in support of Letter of Map Revision Case No. 02-05-2904P, dated November 20, 2002. The starting water-surface elevations for Blue Creek and Yellow Creek were determined using the slope/area method.

Manning's roughness factors ("n" values) were chosen from field inspection of the area and based on values listed in Roughness Characteristics of Natural Channels by H. H. Barnes (Barnes, 1967). The values were chosen assuming late spring-early summer flooding conditions. The channel and overbank "n" values for these streams are shown in the following tabulation:

Table 7. Channel and Overbank Roughness Factors

<u>Stream</u>	<u>Channel "n"</u>	<u>Overbank "n"</u>
St. Marys River	0.031-0.049	0.040-99 (no flow)
Blue Creek	0.055-0.085	0.01-0.20
Yellow Creek	0.035	0.07
Wabash River	0.037-0.049	0.04-0.1
Holthouse Ditch	0.02-0.07	0.035-0.12
Borum Run	0.02-0.07	0.035-0.12

Table 7. Channel and Overbank Roughness Factors (continued)

<u>Stream</u>	<u>Channel “n”</u>	<u>Overbank “n”</u>
Koos Ditch	0.02-0.07	0.035-0.12
Kohne Drain No. 1	0.02-0.07	0.035-0.12
Loblolly Creek	0.02-0.07	0.035-0.12
Limberlost Creek	0.02-0.07	0.035-0.12

Contraction and expansion coefficients of 0.1 and 0.3 were used for reaches between valley cross sections. Bridge transition values of 0.3 and 0.5 were used. At culverts with more abrupt flow transitions, values of 0.6 and 0.9 were used.

For new approximate study areas along the Wabash River, the 100-year flood profile was based upon a network of stream gages along the Wabash River located inside and outside of Adams County. For other new approximate study areas, analyses were based on field inspection and modeling of the stream reaches using simplified HEC-RAS models. Structural measurements or field surveying was not performed. Starting elevations were assumed to be normal depth.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in Base Flood Elevations (BFEs) across the corporate limits between the communities.

In this revision, a vertical datum conversion of -0.50 foot was calculated at the centroid of the county and used to convert all elevations in Adams County from NGVD29 to NAVD88 using the National Geodetic Survey’s VERTCON online utility (VERTCON, 2005).

For more information on NAVD88, see the FEMA publication entitled Converting the National Flood Insurance Program to the North American Vertical Datum of 1988 (FEMA, June 1992), or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20910 (Internet address <http://www.ngs.noaa.gov>).

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance flood elevations and delineations of the 1- and 0.2-percent-annual-chance floodplain boundaries and 1-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, and the Floodway Data Tables. Users should reference the data presented in the FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps provided by the Indiana DNR. This topographic mapping has a 2-contour interval and was derived from an aerial survey performed in 1974.

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE); and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 1-percent-annual chance floodplain boundary is shown on the FIRM.

4.2 Floodways

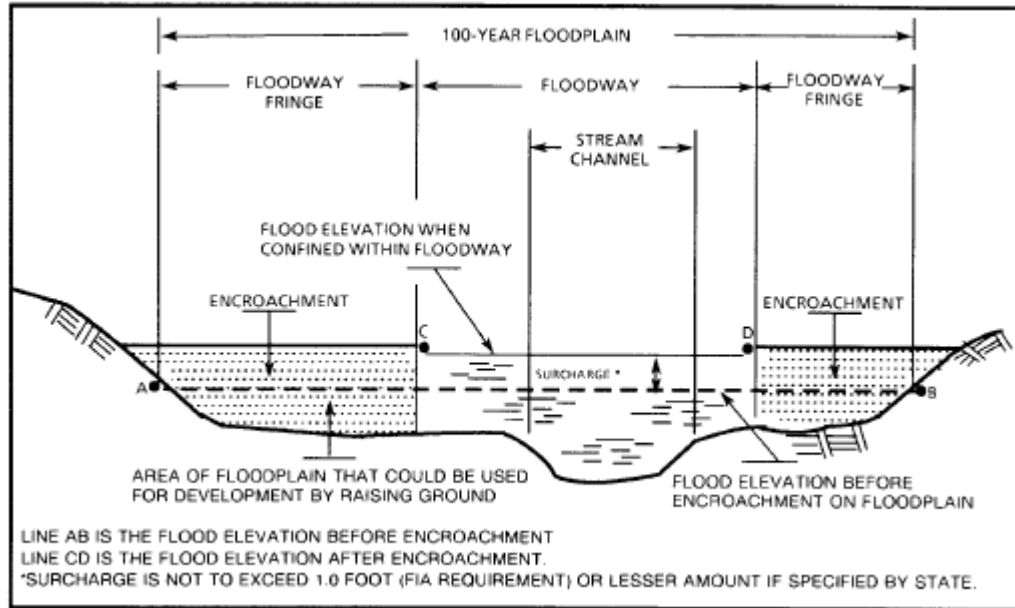
Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

The State of Indiana, however, per Indiana Code IC 14-28-1 and Indiana Administrative Code 312 IAC 10, has designated that encroachment in the floodplain is limited to that which will cause no significant increase in flood height. As a result, floodways for this study are delineated based on a flood surcharge of less than 0.15 feet. The floodways in this study were approved by the IDNR, and are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this FIS report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections (Table 8). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent-annual-chance flood more than the allowable flood surcharge limit at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

Figure 1: Floodway Schematic



FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
BLUE CREEK								
A	3,320	450	2,009	1.6	793.3	787.5 ²	787.6	0.1
B	5,640	800	3,577	0.9	793.3	788.5 ²	788.6	0.1
C	8,387	600	1,885	1.7	793.3	789.9 ²	790.0	0.1
D	10,813	700	2,704	1.2	793.3	791.6 ²	791.7	0.1
E	12,239	600	2,165	1.5	793.3	792.2 ²	792.3	0.1
F	14,079	700	2,223	1.4	793.3	793.1 ²	793.2	0.1
G	16,301	1,000	3,485	0.9	795.0	795.0	795.1	0.1
H	20,610	650	3,199	1.0	798.8	798.8	798.9	0.1
I	21,927	500	2,114	1.5	799.3	799.3	799.4	0.1
J	26,842	350	2,052	1.5	801.6	801.6	801.7	0.1
K	29,873	500	2,351	1.3	803.1	803.1	803.2	0.1
L	34,191	650	2,238	1.4	804.6	804.6	804.7	0.1
M	39,156	500	2,084	1.5	807.4	807.4	807.5	0.1
N	44,831	700	2,035	1.1	809.1	809.1	809.2	0.1
O	46,837	700	2,210	1.1	809.9	809.9	810.0	0.1
P	50,355	500	1,622	1.4	812.5	812.5	812.6	0.1
Q	53,030	400	2,236	1.0	813.4	813.4	813.5	0.1
R	55,230	500	2,022	1.2	814.2	814.2	814.3	0.1
S	58,558	400	1,780	1.3	815.6	815.6	815.7	0.1
T	65,257	450	1,200	1.1	818.5	818.5	818.6	0.1
U	69,228	350	837	1.6	820.8	820.8	820.9	0.1
V	71,782	400	1,559	0.8	823.5	823.5	823.6	0.1
W	73,556	300	1,116	1.2	824.7	824.7	824.8	0.1
X	78,325	350	1,150	1.1	827.6	827.6	827.7	0.1
Y	80,154	500	1,589	0.8	829.5	829.5	829.6	0.1
Z	83,685	850	2,922	0.4	831.2	831.2	831.3	0.1
AA	88,052	450	1,888	0.7	834.1	834.1	834.2	0.1
AB	90,007	88	747	1.7	835.4	835.4	835.5	0.1

¹ FEET ABOVE CONFLUENCE WITH ST. MARYS RIVER

² ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM ST. MARYS RIVER

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY		FLOODWAY DATA
ADAMS COUNTY, IN AND INCORPORATED AREAS		BLUE CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
BORUM RUN								
A	1070 ¹	400	214	6.50	790.5	777.1 ⁴	777.1	0.0
B	3105 ¹	250	698	1.99	790.5	781.6 ⁴	781.6	0.0
C	4800 ¹	411	708	1.96	790.5	782.9 ⁴	782.9	0.0
HOLTHOUSE DITCH								
A	1800 ²	471	1,226	1.99	787.0	776.4 ⁴	776.4	0.0
B	2885 ²	96	570	4.28	787.0	777.7 ⁴	777.7	0.0
C	4500 ²	191	456	5.35	787.0	780.4 ⁴	780.4	0.0
D	6114 ²	171	899	2.71	787.0	783.2 ⁴	783.2	0.0
E	7600 ²	655	3,069	0.80	787.0	783.9 ⁴	783.9	0.0
F	8902 ²	453	1,215	2.00	787.0	784.4 ⁴	784.4	0.0
G	10000 ²	673	1,703	1.43	787.0	785.7 ⁴	785.7	0.0
H	11602 ²	628	1,304	1.87	787.0	787.0	787.0	0.0
I	12521 ²	53	414	5.89	788.5	788.5	788.5	0.0
J	13402 ²	515	1,917	1.27	789.5	789.5	789.5	0.0
KOHNE DRAIN NO. 1								
A	100 ³	36	119	3.95	787.0	778.6 ⁴	778.6	0.0
B	524 ³	363	1,558	0.30	787.0	785.8 ⁴	785.8	0.0
C	960 ³	202	241	1.95	787.0	786.0 ⁴	786.0	0.0
D	263 ³	70	239	1.97	787.4	787.4	787.4	0.0
E	4341 ³	196	736	0.64	795.4	795.4	795.4	0.0
F	5704 ³	181	264	1.78	795.8	795.8	795.8	0.0
G	6337 ³	191	276	1.70	798.6	798.6	798.6	0.0
H	6984 ³	66	282	1.67	801.8	801.8	801.8	0.0
I	7968 ³	160	590	0.80	802.6	802.6	802.6	0.0

¹ FEET ABOVE MOUTH

⁴ ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM ST. MARYS RIVER

² FEET ABOVE CONFLUENCE WITH ST. MARYS RIVER

³ FEET ABOVE CONFLUENCE WITH HOLTHOUSE DITCH

TABLE 8	FEDERAL EMERGENCY MANAGEMENT AGENCY				FLOODWAY DATA			
	ADAMS COUNTY, IN AND INCORPORATED AREAS				BORUM RUN-HOLTHOUSE DITCH-KOHNE DRAIN NO. 1			

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
KOOS DITCH								
A	2300 ¹	261	258	2.11	789.2	775.4 ⁸	775.4	0.0
B	3400 ¹	229	295	1.85	789.2	780.1 ⁸	780.1	0.0
C	4700 ¹	74	219	2.49	789.2	783.8 ⁸	783.8	0.0
D	5360 ¹	167	219	2.49	789.2	785.4 ⁸	785.4	0.0
E	6341 ¹	146	149	3.66	789.2	787.2 ⁸	787.2	0.0
F	7629 ¹	40	175	3.11	789.9	789.9	789.9	0.0
G	8341 ¹	40	150	3.63	791.5	791.5	791.5	0.0
LIMBERLOST CREEK								
A	3500 ²	1,442	1,817	1.52	832.4	830.6 ⁴	830.6	0.0
B	4800 ²	932	1,480	1.86	832.4	830.6 ⁴	831.5	0.0
LOBLOLLY CREEK								
A	518	2650 ⁵	9,170	1.19	831.1	830.7 ⁷	830.7	0.0
B	1,700	1,396	7,032	0.74	831.1	831.0 ⁷	831.0	0.0
C	2,900	1,858	10,783	0.48	831.1	831.0 ⁷	831.0	0.0
D	4,374	2,030	9,181	0.57	831.1	831.0 ⁷	831.0	0.0
E	5,409	1,880	1,603	3.24	831.7	831.7	831.7	0.0
F	6,218	2,320	2,374	2.19	832.4	832.4	832.4	0.0
G	7,700	1,560	11,217	0.34	832.5	832.5	832.5	0.0
H	9,000	1,291	7,658	0.50	832.5	832.5	832.5	0.0
I	10,309	2,700	8,018	0.47	832.6	832.6	832.6	0.0
J	11,400	2,672	10,289	0.37	832.6	832.6	832.6	0.0
K	13,700	2,500	13,248	0.27	832.6	832.6	832.6	0.0
L	15,100	2700 ⁶	11,442	0.33	832.6	832.6	832.6	0.0
M	16,592	2448 ⁶	9,675	0.39	832.6	832.6	832.6	0.0

¹ FEET ABOVE MOUTH

² FEET ABOVE CONFLUENCE WITH LOBLOLLY CREEK

³ FEET ABOVE CONFLUENCE WITH HOLHOUSE DITCH

⁴ ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM LOBLOLLY CREEK

⁵ COMBINED FLOODWAY WIDTH OF WABASH RIVER AND LOBLOLLY CREEK

⁶ WIDTH EXTENDS BEYOND COUNTY BOUNDARY

⁷ ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS OF WABASH RIVER

⁸ ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM ST. MARY'S RIVER

TABLE 8	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	ADAMS COUNTY, IN AND INCORPORATED AREAS	KOOS DITCH-LIMBERLOST CREEK-LOBLOLLY CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
ST. MARYS RIVER								
A	106,128	1,160	6,117	2.4	778.7	778.7	778.7	0.0
B	110,743	1,492	11,065	1.4	779.9	779.9	780.0	0.1
C	115,373	930	7,798	1.9	780.7	780.7	780.8	0.1
D	123,273	1,230	10,155	1.5	782.2	782.2	782.3	0.1
E	128,673	1,510	13,955	1.1	783.1	783.1	783.2	0.1
F	131,773	1,412	13,675	1.1	783.5	783.5	783.5	0.0
G	137,823	1,466	10,099	1.5	783.9	783.9	784.0	0.1
H	141,753	2,110	16,325	0.9	784.4	784.4	784.4	0.0
I	147,683	1,923	11,367	1.9	786.4	786.4	786.4	0.0
J	149,483	1,885	17,282	1.0	786.8	786.8	786.8	0.0
K	150,083	1,705	16,757	1.1	786.9	786.9	786.9	0.0
L	154,853	599	6,930	2.1	788.3	788.3	788.3	0.0
M	158,158	1,862	16,498	0.9	789.1	789.1	789.1	0.0
N	159,108	1,647	13,606	1.1	789.1	789.1	789.2	0.1
O	160,388	1,064	12,369	1.3	789.2	789.2	789.3	0.1
P	161,333	543	7,354	2.0	789.3	789.3	789.3	0.0
Q	162,283	263	4,143	3.5	789.4	789.4	789.5	0.1
R	163,988	992	11,853	1.2	789.9	789.9	789.9	0.0
S	165,018	606	7,721	1.9	789.9	789.9	790.0	0.1
T	166,543	965	10,247	1.4	790.3	790.3	790.4	0.1
U	167,543	1,660	17,237	0.8	790.4	790.4	790.5	0.1
V	168,903	2,458	20,705	0.7	790.5	790.5	790.5	0.0
W	170,523	2,823	20,539	0.7	790.5	790.5	790.6	0.1
X	176,383	2,032	14,939	1.0	790.9	790.9	790.9	0.0
Y	182,233	1,445	11,330	1.3	791.5	791.5	791.5	0.0
Z	187,963	1,680	16,144	0.9	792.0	792.0	792.1	0.1
AA	193,533	1,480	11,807	1.2	792.4	792.4	792.5	0.1
AB	201,883	1,745	13,570	1.1	793.2	793.2	793.3	0.1
AC	209,913	1,420	11,566	0.9	794.0	794.0	794.1	0.1

¹ FEET ABOVE MOUTH

TABLE 8	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	ADAMS COUNTY, IN AND INCORPORATED AREAS	ST. MARYS RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION				
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)	
WABASH RIVER									
	A	15,700	2,169	7,042	1.9	822.5	822.5	822.5	0.0
	B	16,700	2,066	8,102	1.7	822.2	822.2	822.2	0.0
	C	17,535	1,500	4,910	2.8	822.6	822.6	822.6	0.0
	D	18,298	1,560	4,946	2.8	822.9	822.9	822.9	0.0
	E	19,648	1,938	7,092	1.9	823.3	823.3	823.3	0.0
	F	21,798	1,420	6,922	2.0	823.7	823.7	823.7	0.0
	G	22,898	1,100	4,686	2.9	824.1	824.1	824.1	0.0
	H	23,998	1,396	7,884	1.7	824.5	824.5	824.5	0.0
	I	25,598	1,926	5,912	2.3	824.7	824.7	824.7	0.0
	J	26,898	2,000	5,593	2.4	825.1	825.1	825.1	0.0
	K	28,498	1,849	6,991	1.9	825.6	825.6	825.6	0.0
	L	29,348	1,678	6,529	2.0	825.8	825.8	825.8	0.0
	M	53,178	1,460	5,296	2.5	829.0	829.0	829.0	0.0
	N	54,628	1,892	11,065	1.2	829.5	829.5	829.5	0.0
	O	56,228	1,800	11,187	1.2	829.7	829.7	829.7	0.0
	P	57,613	1,400	3,526	3.7	829.9	829.9	829.9	0.0
	Q	58,813	1,480	11,206	1.2	830.4	830.4	830.4	0.0
	R	60,413	2,118	7,908	1.7	830.5	830.5	830.5	0.0
	S	61,613	2,470	9,504	1.4	830.7	830.7	830.7	0.0
	T	63,013	2,172	10,448	1.2	830.9	830.9	830.9	0.0
	U	64,213	2,475	12,597	1.0	831.0	831.0	831.0	0.0
	V	66,263	2,589	10,108	1.3	831.2	831.2	831.2	0.0
	W	68,240	2650 ²	9,170	1.2	831.6	831.6	831.6	0.0
	X	69,990	1,905	11,227	1.0	831.9	831.9	831.9	0.0
	Y	71,340	2,384	11,393	1.0	831.9	831.9	831.9	0.0
	Z	72,540	1,907	8,162	1.3	832.0	832.0	832.0	0.0

¹ FEET ABOVE COUNTY BOUNDARY

² COMBINED FLOODWAY WIDTH OF WABASH RIVER AND LOBLOLLY CREEK

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

ADAMS COUNTY, IN AND INCORPORATED AREAS

FLOODWAY DATA

WABASH RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
WABASH RIVER								
AA	73840 ¹	1,982	11,564	0.94	832.2	832.2	832.2	0.0
AB	75440 ¹	2,118	11,840	0.92	832.4	832.4	832.4	0.0
AC	76790 ¹	2,168	10,661	1.02	832.5	832.5	832.5	0.0
AD	77890 ¹	1,733	7,343	1.48	832.6	832.6	832.6	0.0
AE	80340 ¹	2,060	8,407	1.30	832.8	832.8	832.8	0.0
AF	81540 ¹	2,223	10,586	1.03	832.8	832.8	832.8	0.0
AG	83840 ¹	2,212	6,608	1.65	832.9	832.9	832.9	0.0
AH	85540 ¹	1,850	6,098	1.79	833.3	833.3	833.3	0.0
YELLOW CREEK								
A	650 ²	162	303	4.50	791.1	780.1 ³	780.2	0.1
B	5982 ²	387	1,176	1.20	791.1	784.3 ³	784.4	0.1
C	11803 ²	75	231	3.60	791.1	786.7 ³	786.8	0.1

⁰ FEET ABOVE COUNTY BOUNDARY

² FEET ABOVE CONFLUENCE WITH ST. MARYS RIVER

³ ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM ST. MARYS RIVER

TABLE 8	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	ADAMS COUNTY, IN AND INCORPORATED AREAS	WABASH RIVER-YELLOW CREEK

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or base flood depths are shown within this zone.

Zone AE

Zone AE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot base flood depths derived from the detailed hydraulic analyses are shown within this zone.

Zone AR

Zone AR is the flood insurance risk zone that corresponds to an area of special flood hazard formerly protected from the 1-percent-annual-chance flood event by a flood-control system that was subsequently decertified. Zone AR indicates that the former flood-control system is being restored to provide protection from the 1-percent-annual-chance or greater flood event.

Zone A99

Zone A99 is the flood insurance risk zone that corresponds to areas of the 1-percent-annual-chance floodplain that will be protected by a Federal flood protection system

where construction has reached specified statutory milestones. No BFEs or depths are shown within this zone.

Zone V

Zone V is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no BFEs are shown within this zone.

Zone VE

Zone VE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance risk zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by levees. No BFEs or base flood depths are shown within this zone.

Zone X (Future Base Flood)

Zone X (Future Base Flood) is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined based on future-conditions hydrology. No BFEs or base flood depths are shown within this zone.

Zone D

Zone D is the flood insurance risk zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance risk zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent-annual-chance floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The current FIRM presents flooding information for the entire geographic area of Adams County. Previously, separate FIRMs were prepared for each identified flood prone incorporated community and for the unincorporated areas of the county. Historical data relating to the maps prepared for each community are presented in FIRM Panel Index and/or Table 9, "Community Map History".

7.0 OTHER STUDIES

This FIS report either supersedes or is compatible with all previous studies on streams studied in this report and should be considered authoritative for purposes of the NFIP.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Flood Insurance and Mitigation Division, Federal Emergency Management Agency, Region V, 536 S. Clark Street, 6th Floor, Chicago, IL 60605

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Adams County (Unincorporated Areas)	August 26, 1977	None	August 3, 1981	October 16, 2003
Berne, City of	October 16, 2003	None	October 16, 2003	None
Decatur, City of	November 23, 1973	None	July 2, 1981	October 16, 2003
Geneva, Town of	November 23, 1973	None	November 1, 1984	October 16, 2003
Monroe, Town of	October 16, 2003	None	October 16, 2003	None

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY
**ADAMS COUNTY, IN
 (AND INCORPORATED AREAS)**

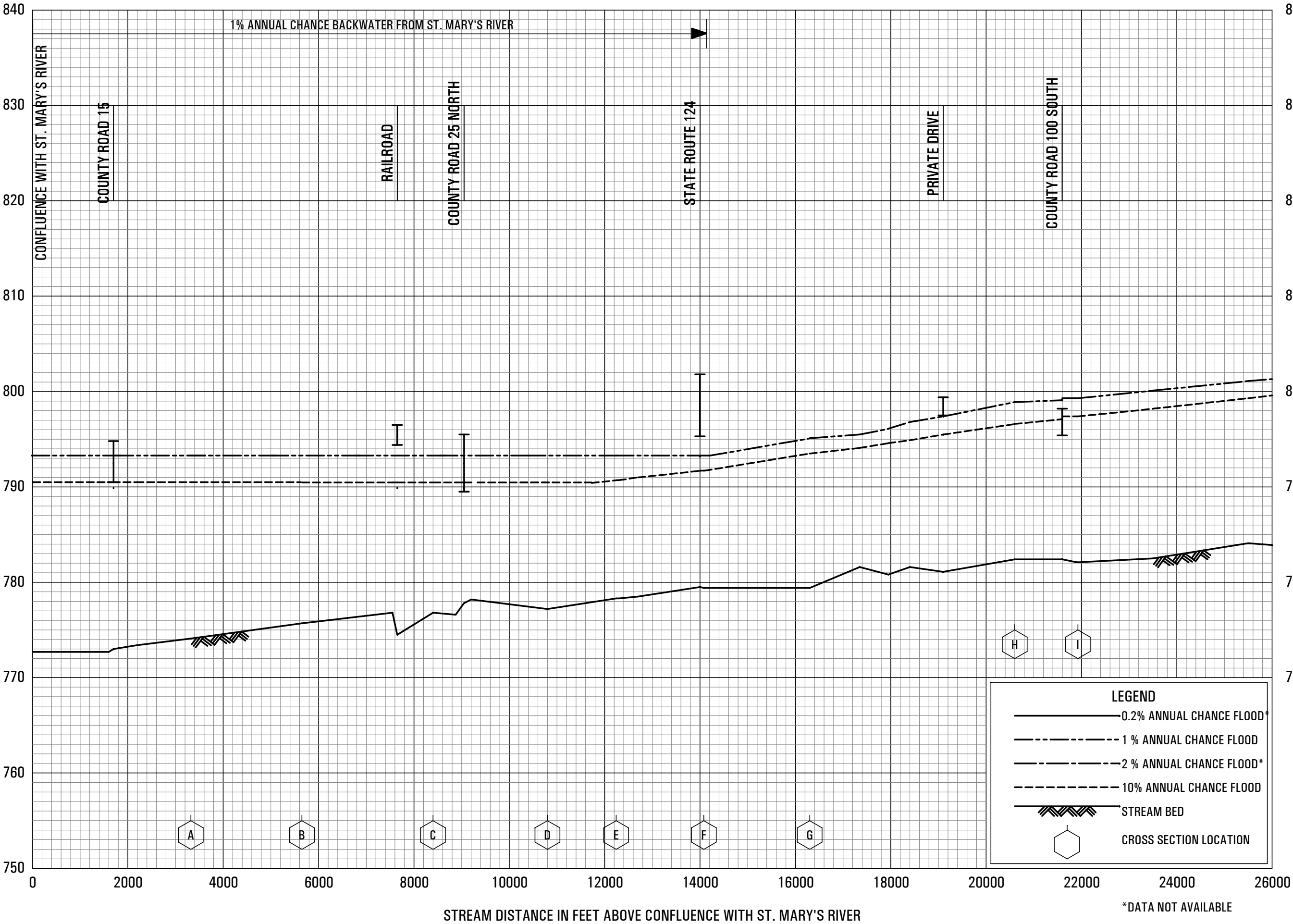
COMMUNITY MAP HISTORY

9.0 BIBLIORAPHY AND REFERENCES

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ELEVATION IN FEET (NAVD 88)

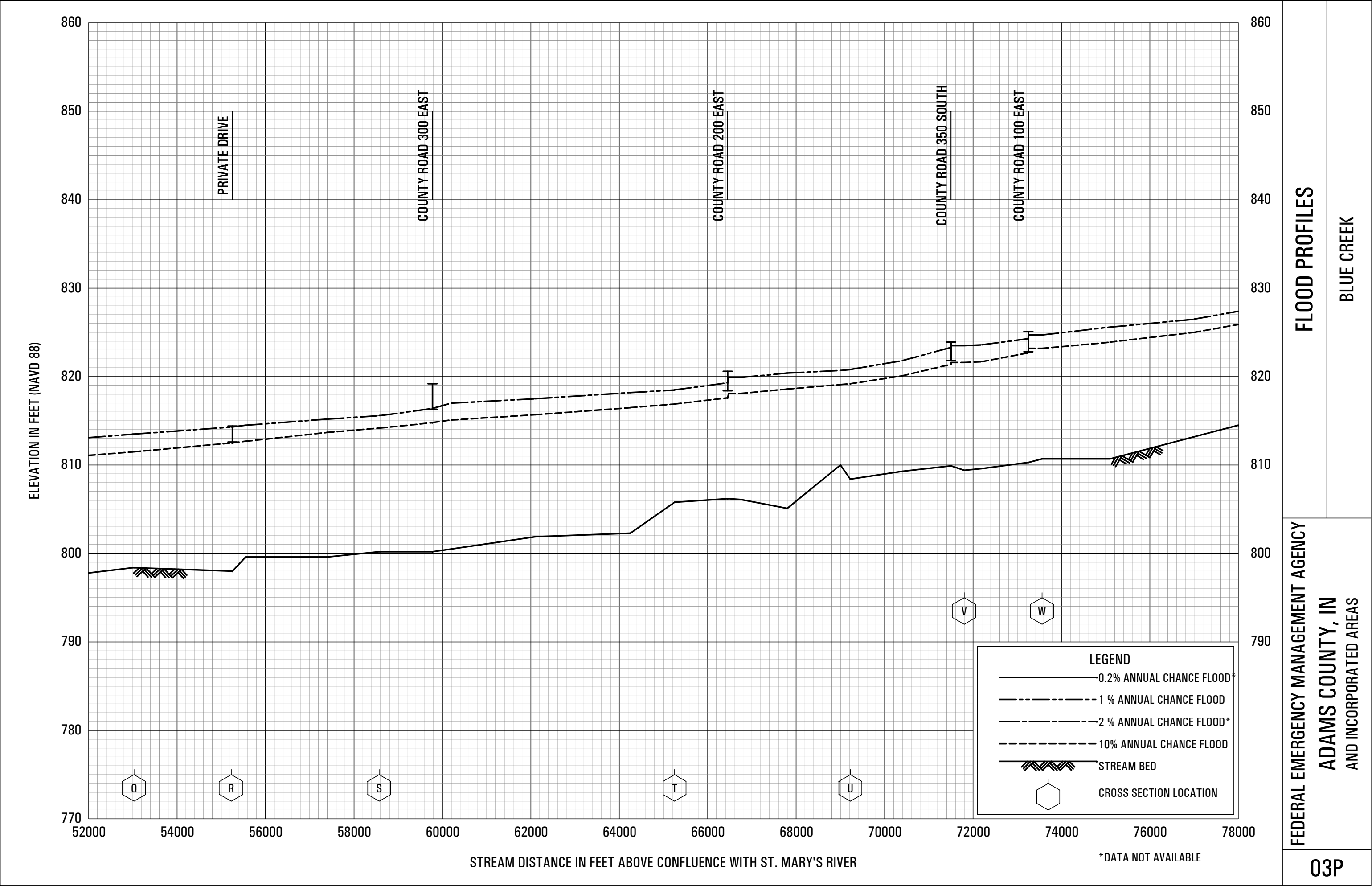


FLOOD PROFILES

BLUE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ADAMS COUNTY, IN
AND INCORPORATED AREAS

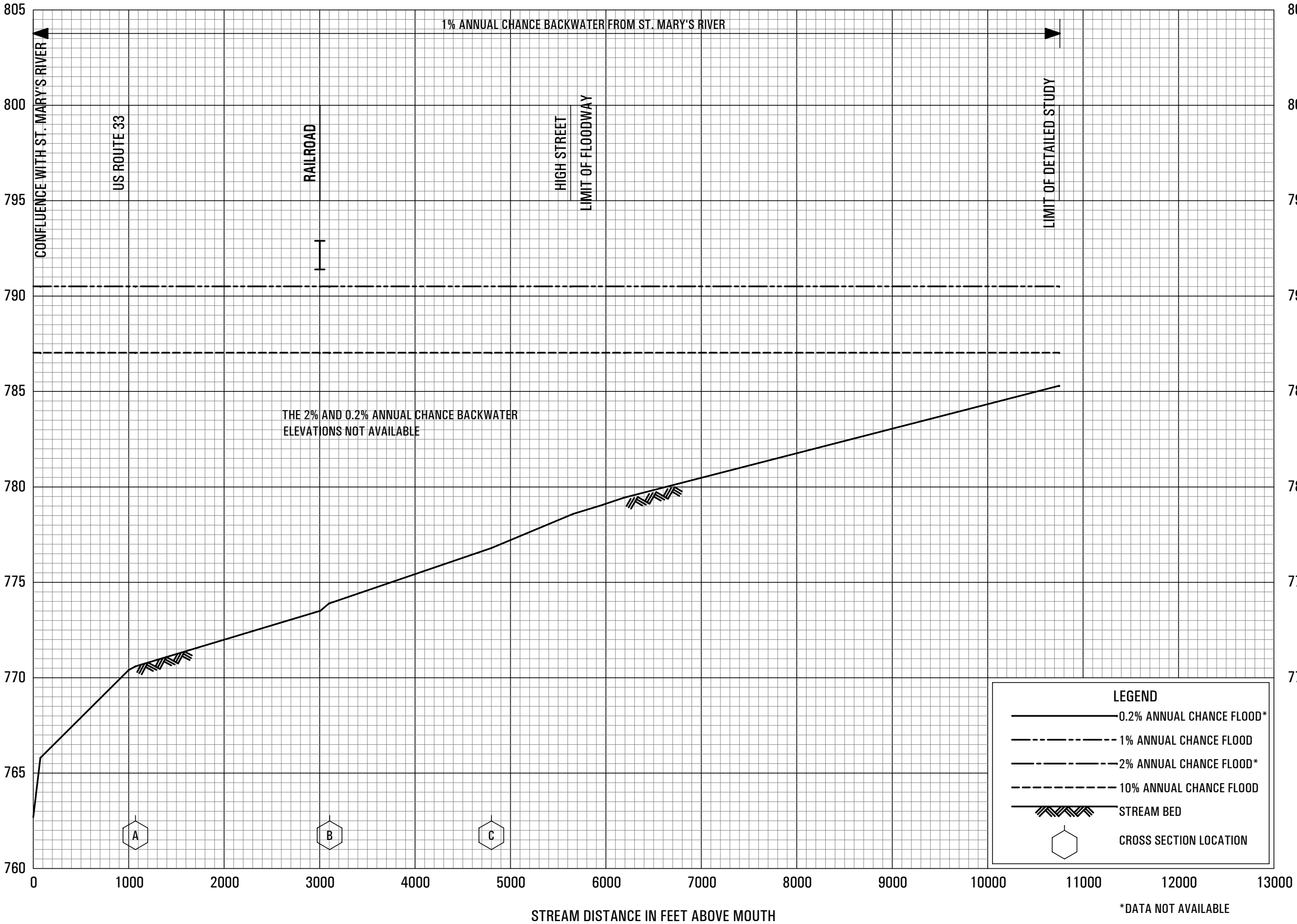


FLOOD PROFILES

BLUE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
ADAMS COUNTY, IN
AND INCORPORATED AREAS

ELEVATION IN FEET (NAVD 88)



FLOOD PROFILES

BORUM RUN

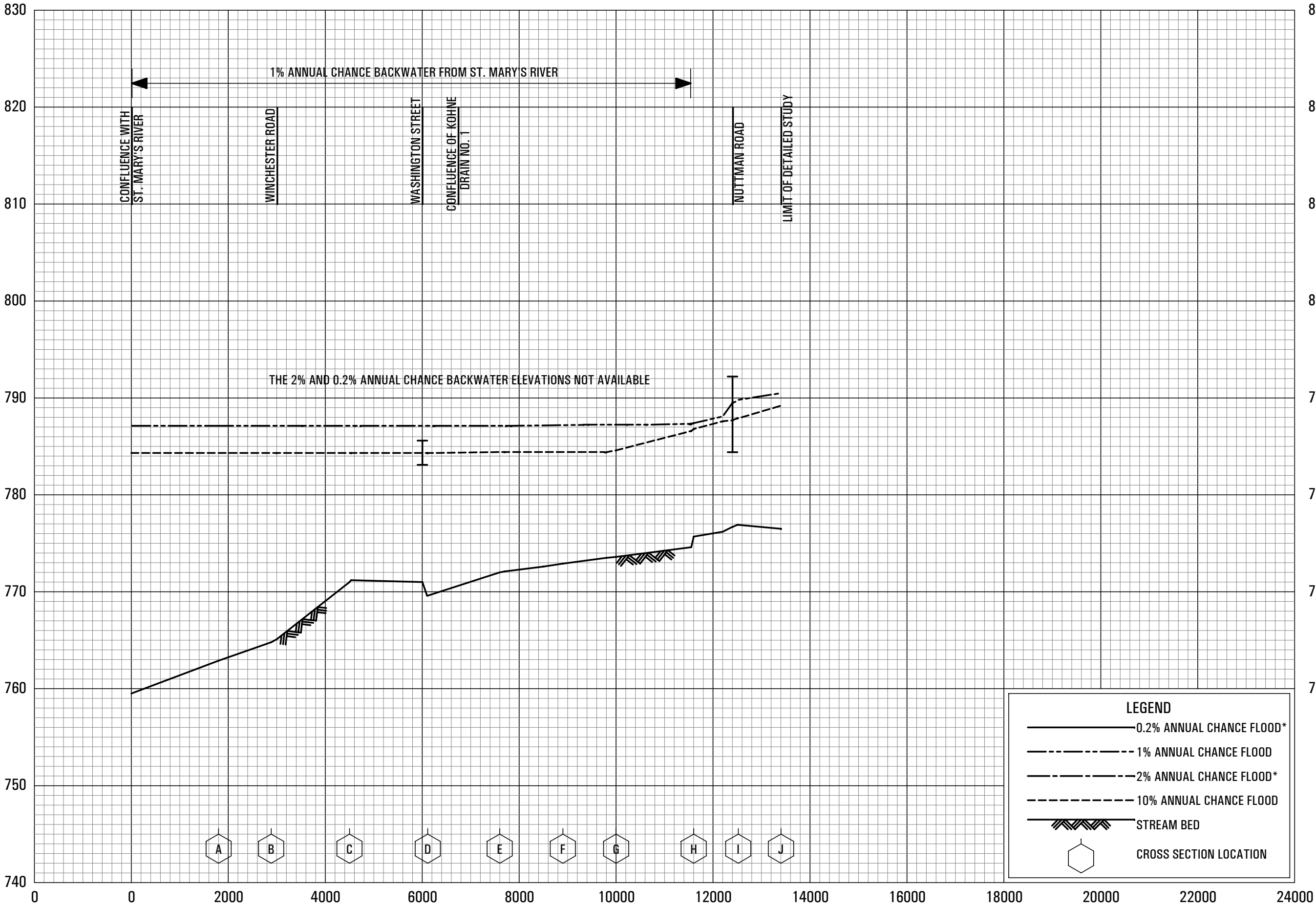
FEDERAL EMERGENCY MANAGEMENT AGENCY

ADAMS COUNTY, IN

AND INCORPORATED AREAS

05P

ELEVATION IN FEET (NAVD 88)



STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ST. MARY'S RIVER

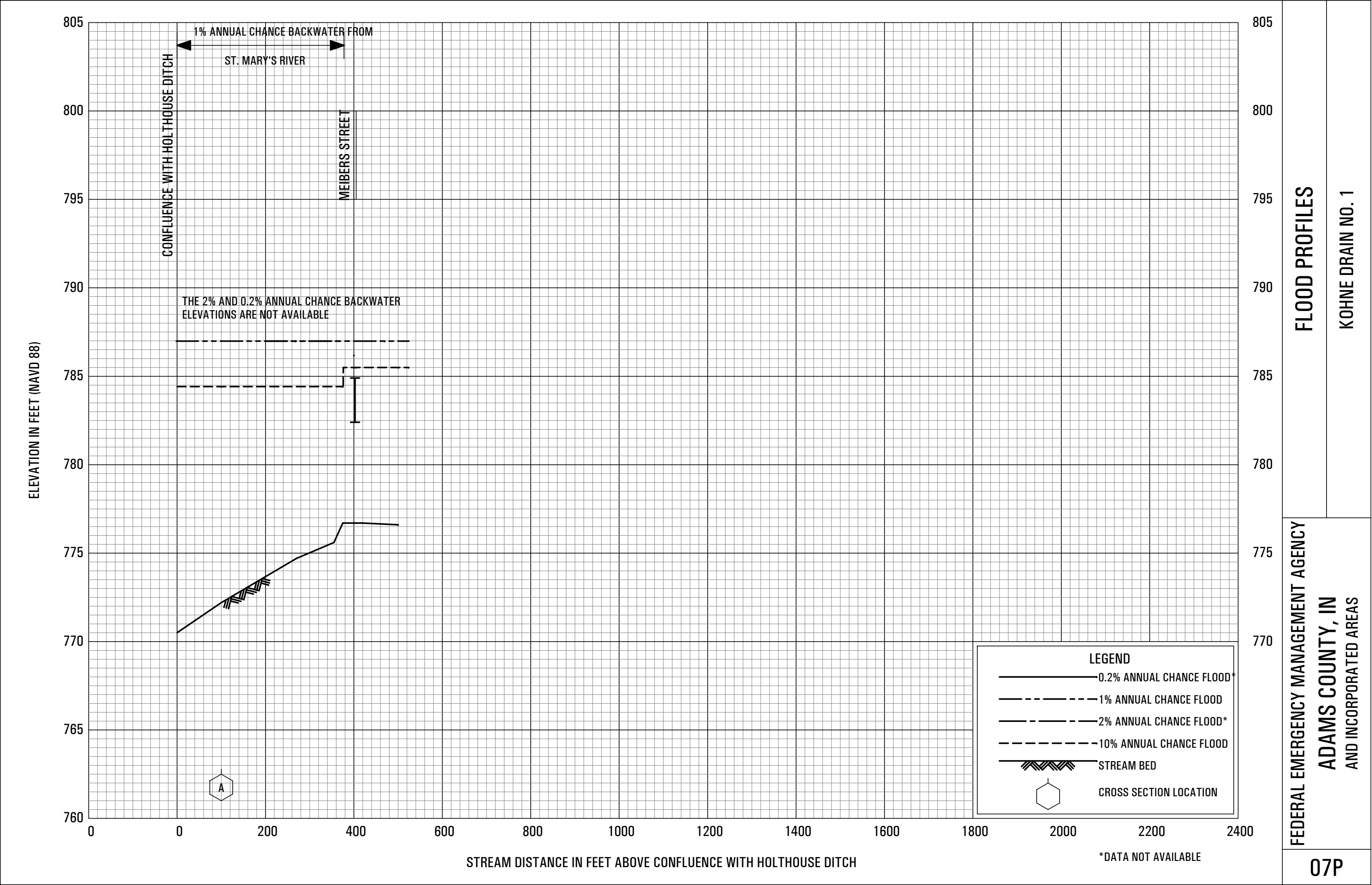
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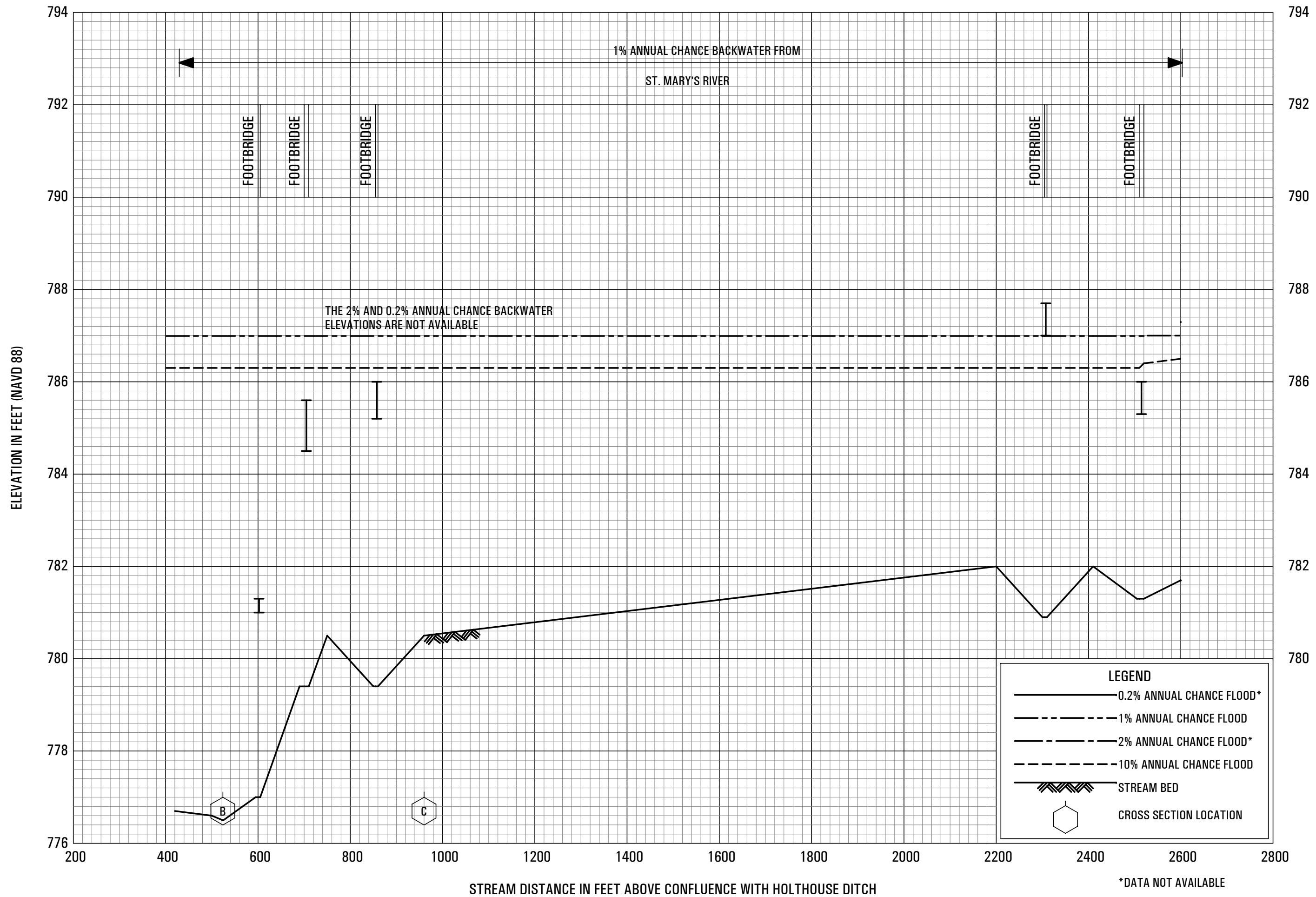
FLOOD PROFILES

HOLTHOUSE DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

ADAMS COUNTY, IN
AND INCORPORATED AREAS



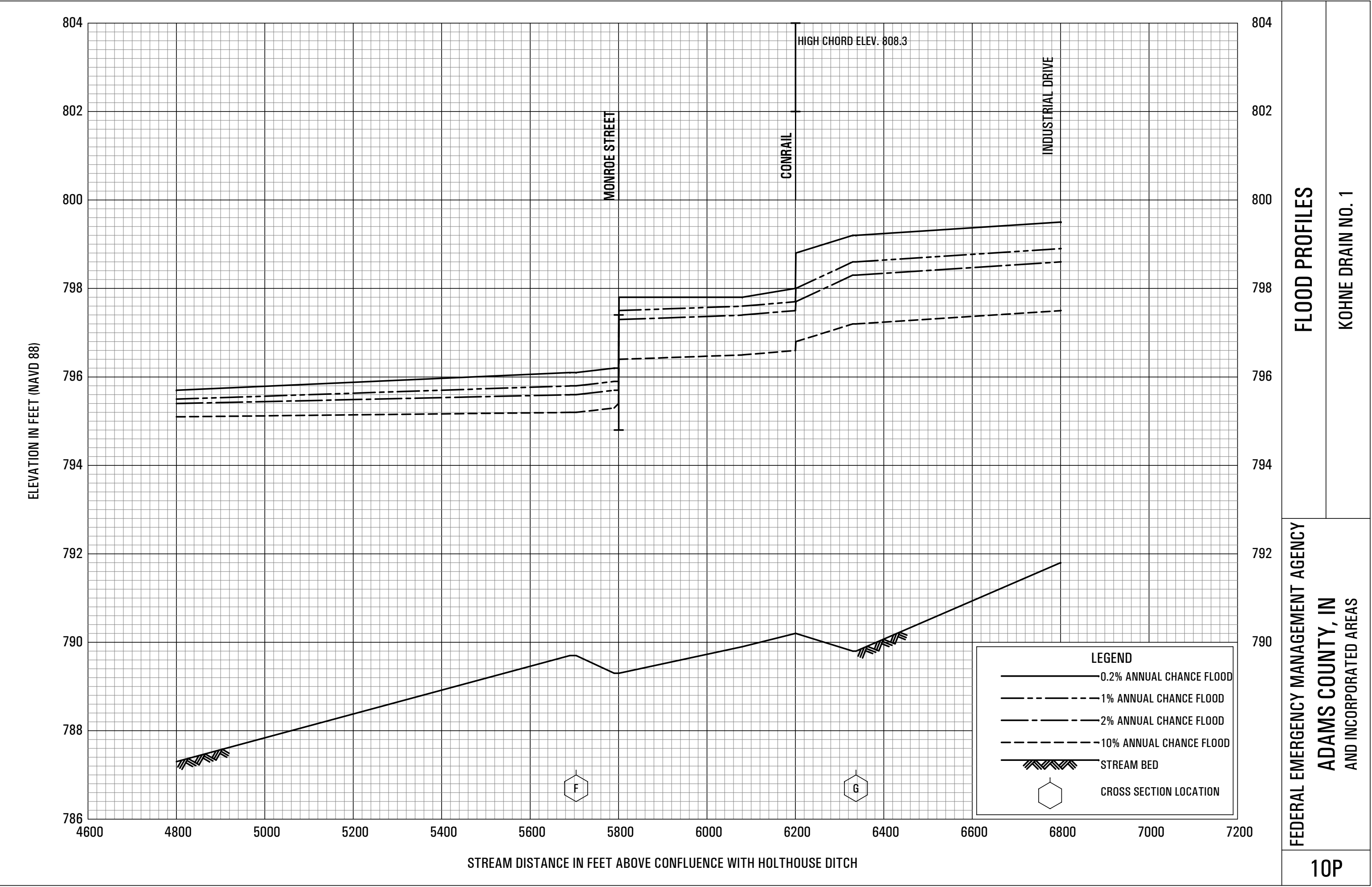


FLOOD PROFILES

KOHN DRAIN NO. 1

**FEDERAL EMERGENCY MANAGEMENT AGENCY
ADAMS COUNTY, IN
AND INCORPORATED AREAS**

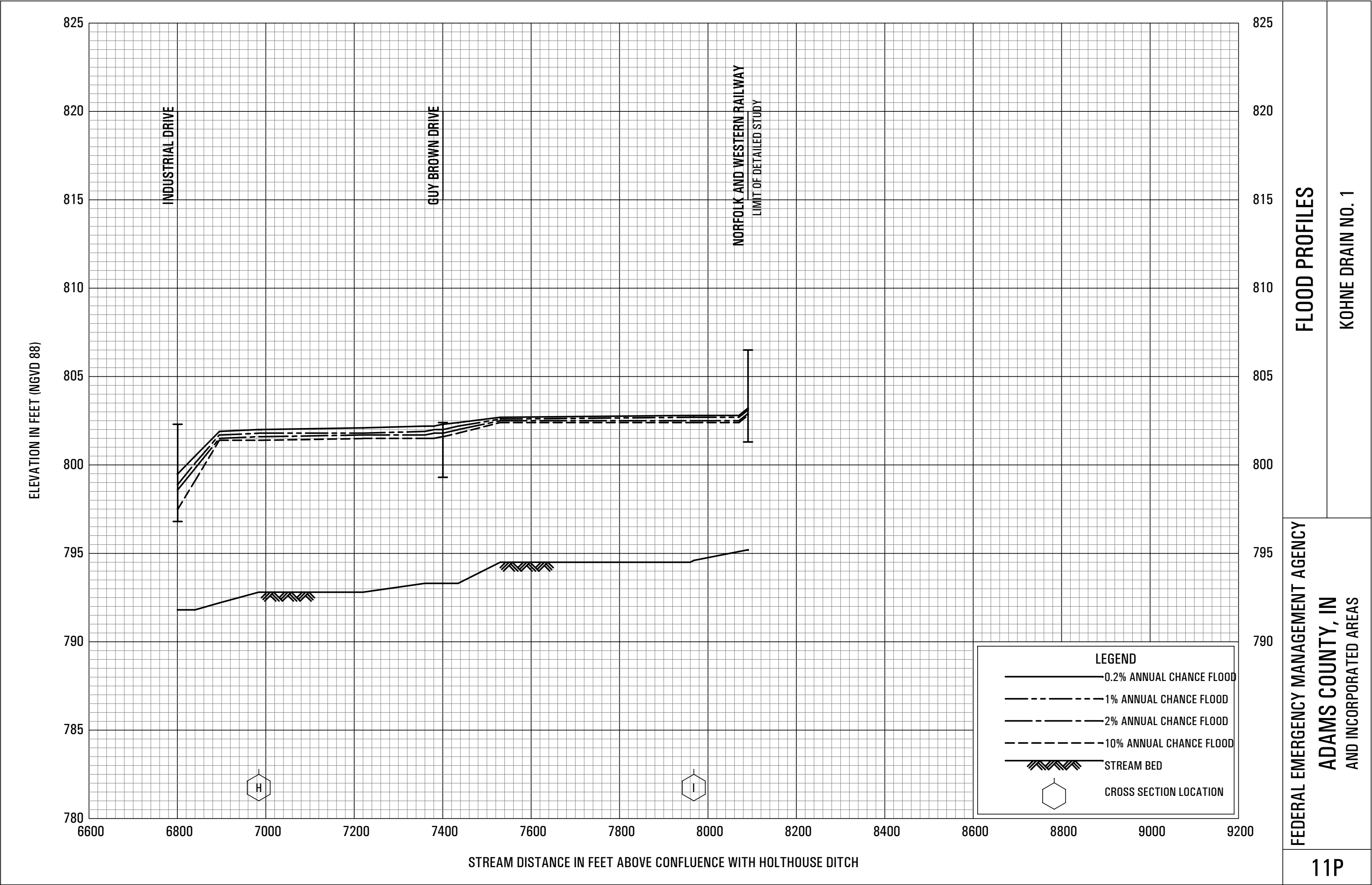
08P



FLOOD PROFILES

KOHNE DRAIN NO. 1

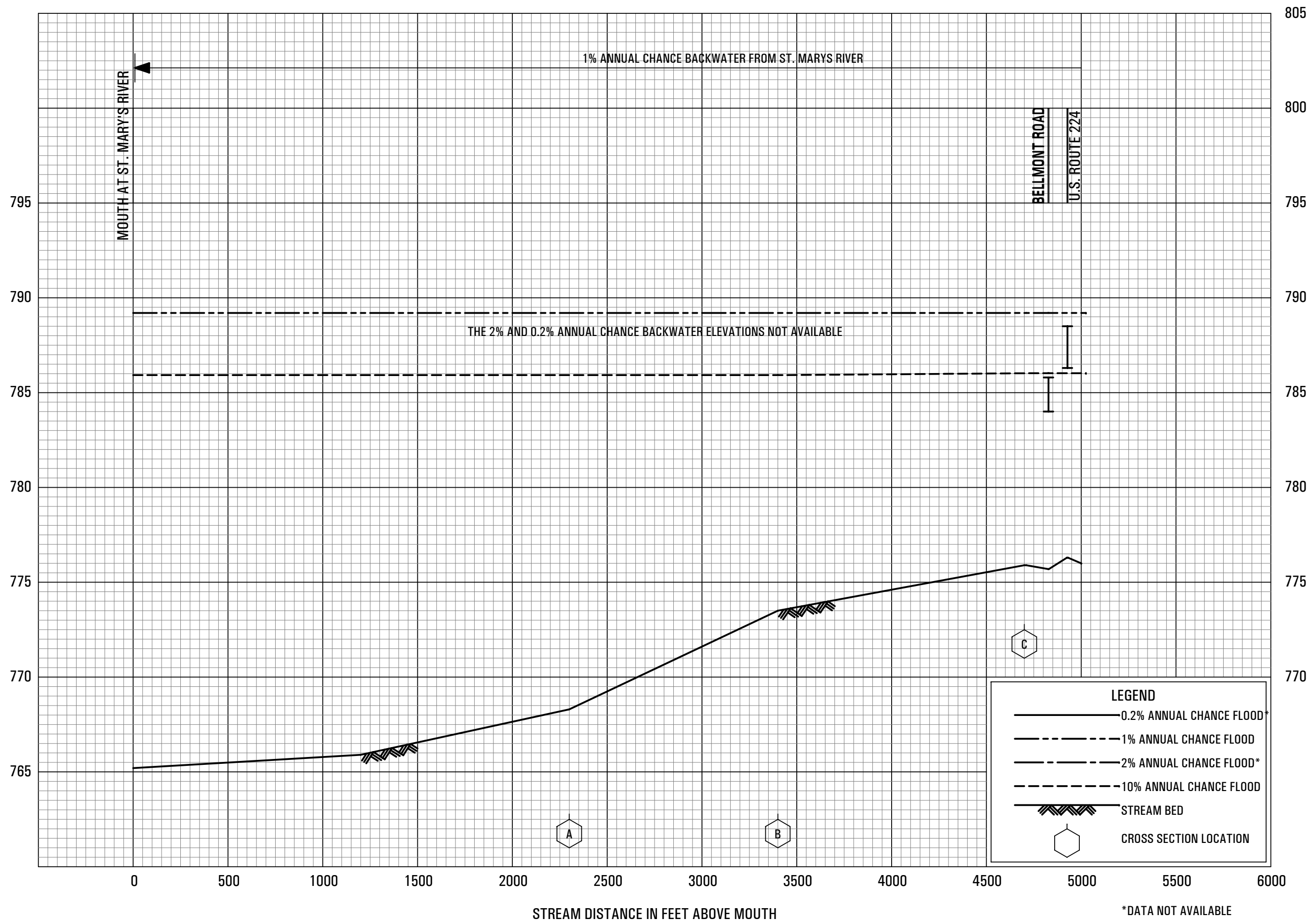
FEDERAL EMERGENCY MANAGEMENT AGENCY
ADAMS COUNTY, IN
AND INCORPORATED AREAS



FLOOD PROFILES

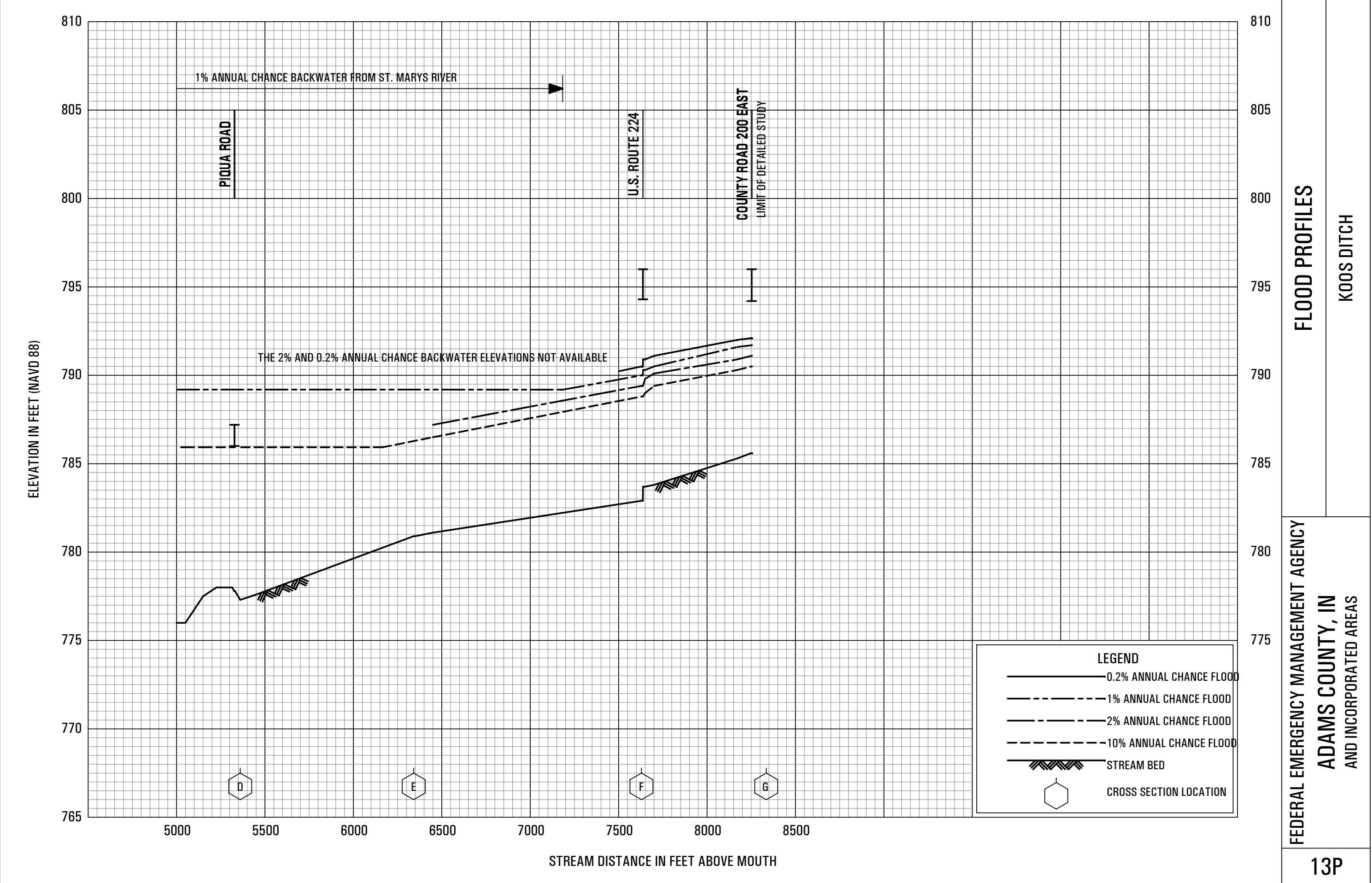
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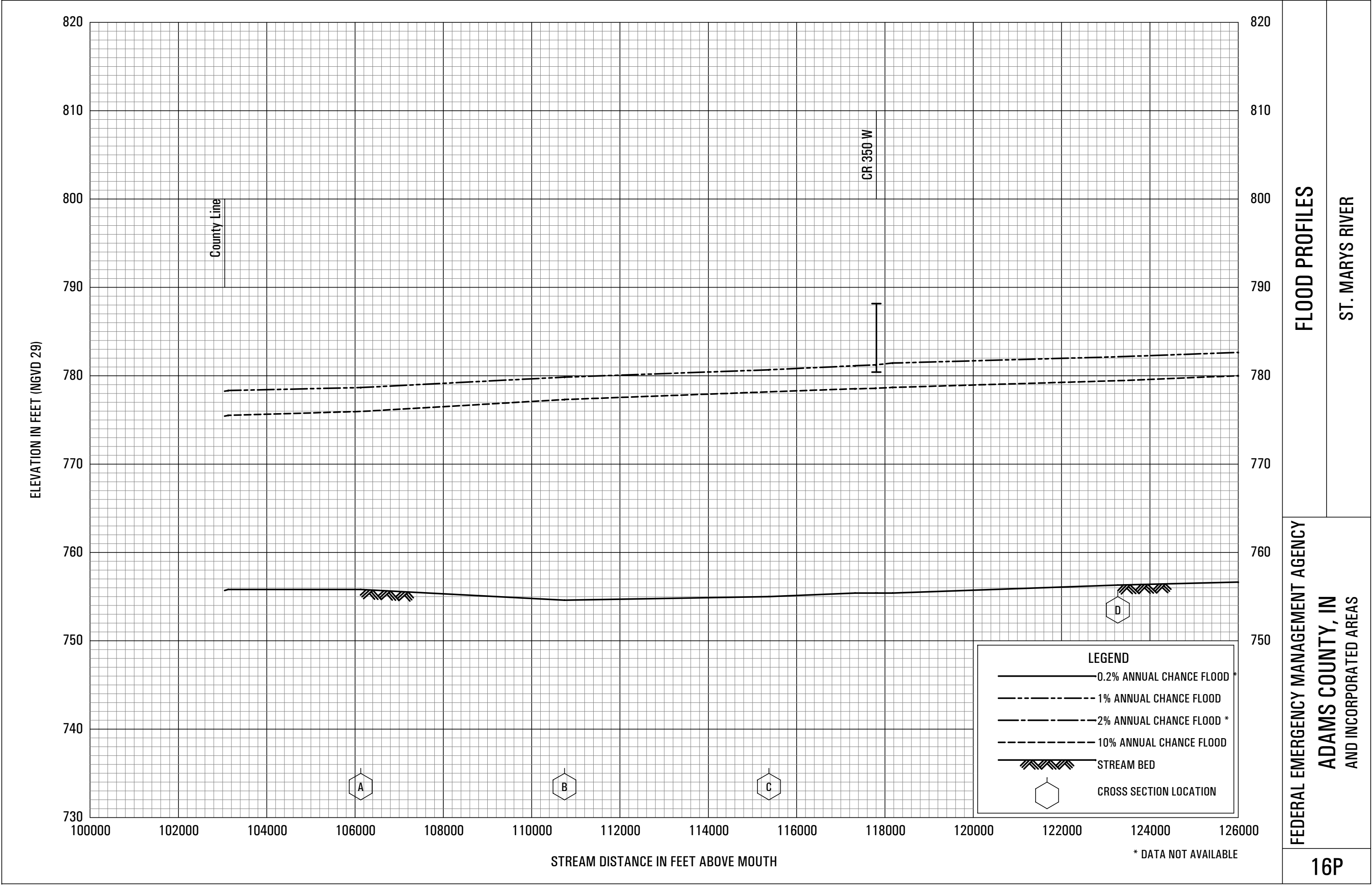
FEDERAL EMERGENCY MANAGEMENT AGENCY
ADAMS COUNTY, IN
AND INCORPORATED AREAS



**FEDERAL EMERGENCY MANAGEMENT AGENCY
ADAMS COUNTY, IN
AND INCORPORATED AREAS**

12P



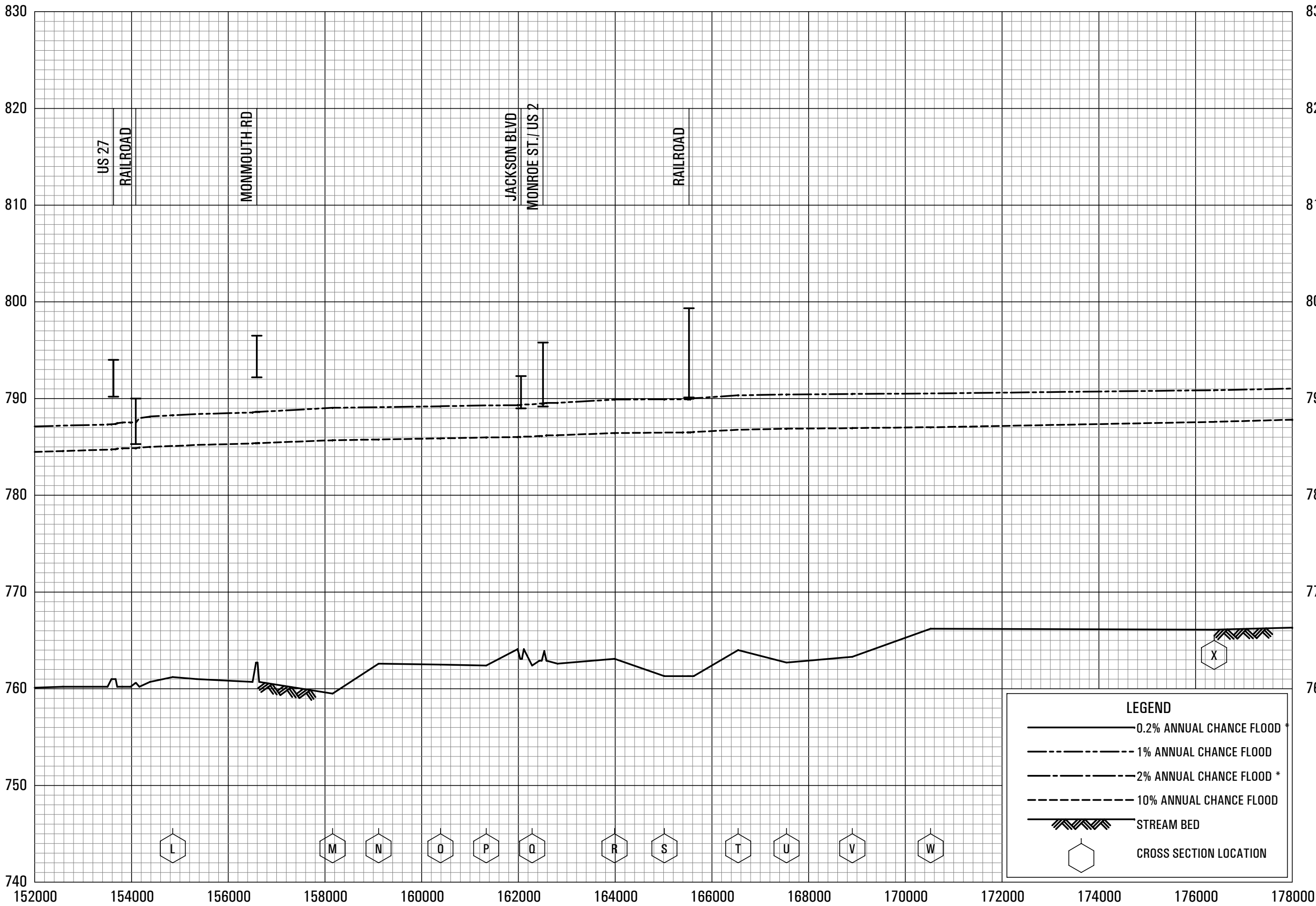


FLOOD PROFILES

ST. MARYS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
ADAMS COUNTY, IN
AND INCORPORATED AREAS

ELEVATION IN FEET (NGVD 29)



* DATA NOT AVAILABLE

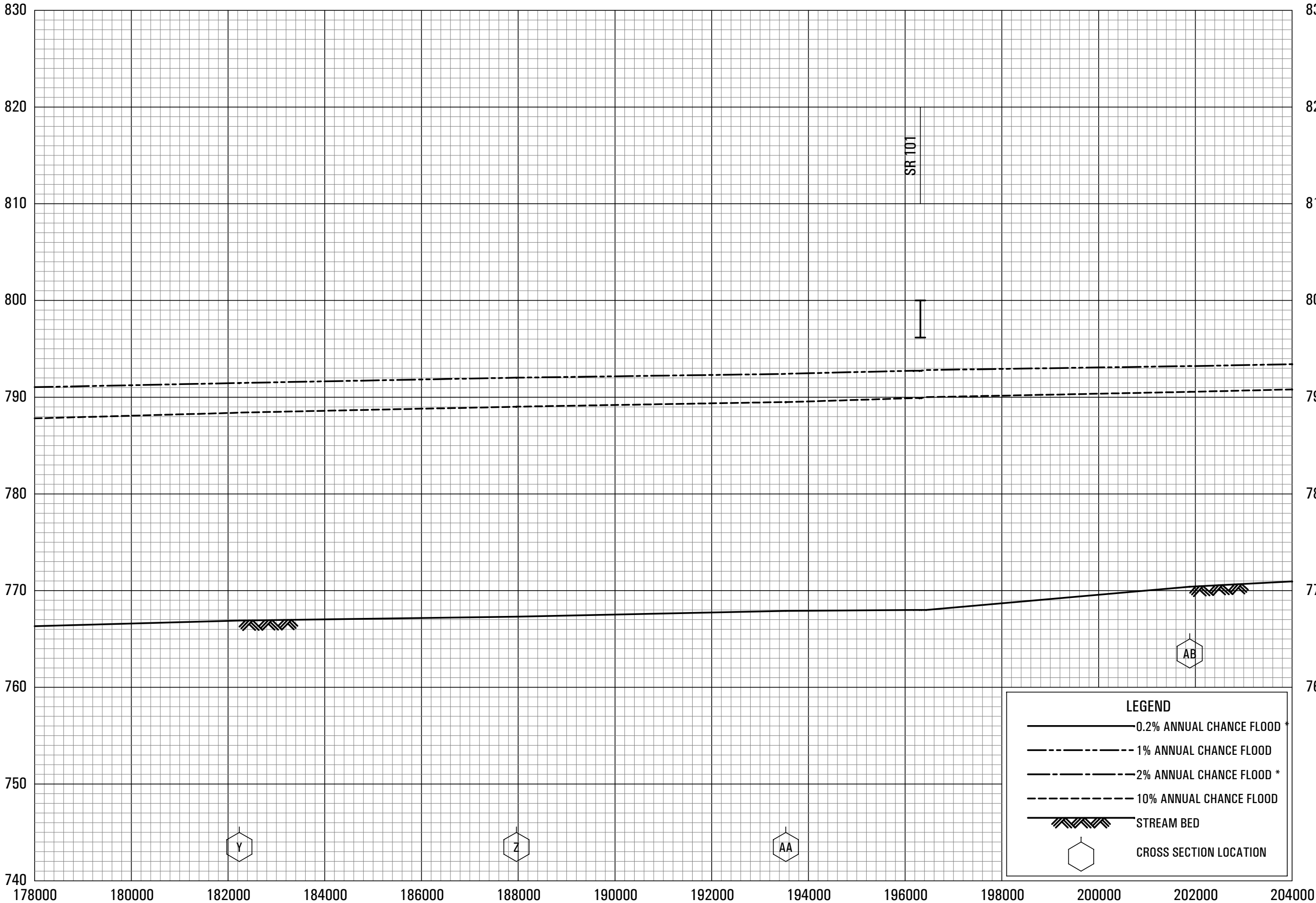
FEDERAL EMERGENCY MANAGEMENT AGENCY

ADAMS COUNTY, IN
AND INCORPORATED AREAS

FLOOD PROFILES

ST. MARYS RIVER

ELEVATION IN FEET (NGVD 29)

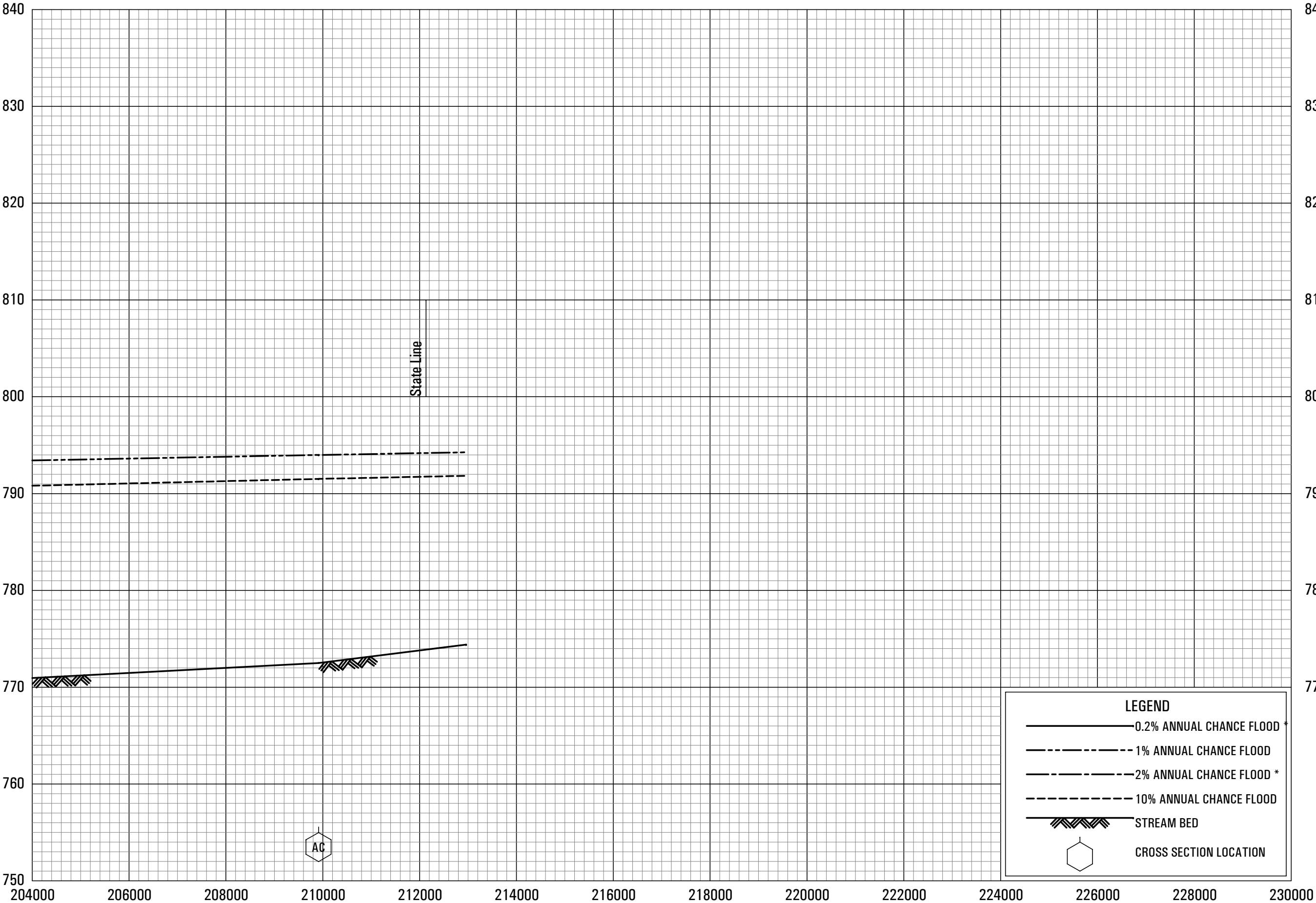


* DATA NOT AVAILABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY
ADAMS COUNTY, IN
AND INCORPORATED AREAS

FLOOD PROFILES
ST. MARYS RIVER

ELEVATION IN FEET (NGVD 29)



STREAM DISTANCE IN FEET ABOVE MOUTH

* DATA NOT AVAILABLE

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD *

10% ANNUAL CHANCE FLOOD

STREAM BED

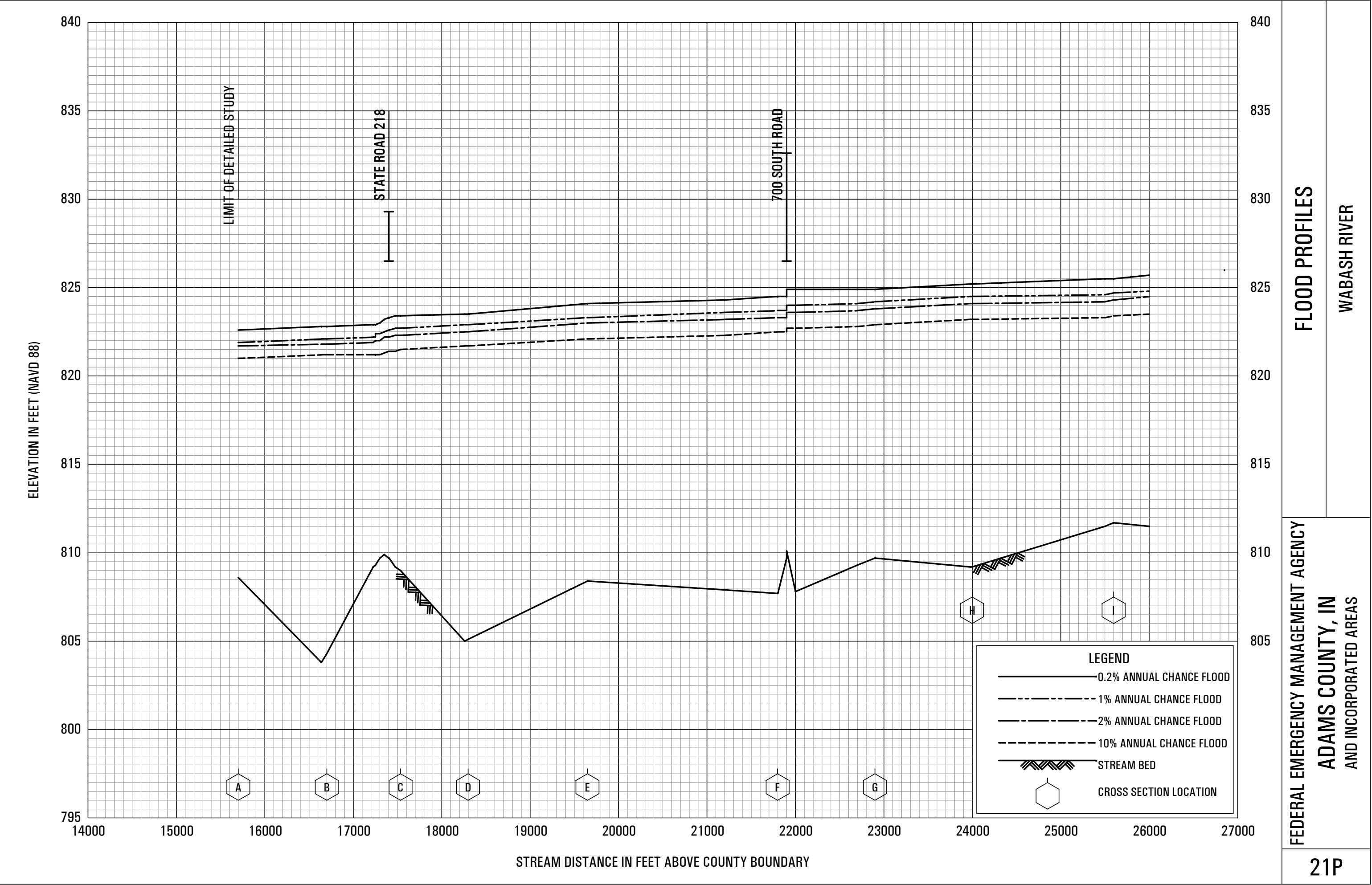
CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

ADAMS COUNTY, IN
AND INCORPORATED AREAS

FLOOD PROFILES

ST. MARYS RIVER

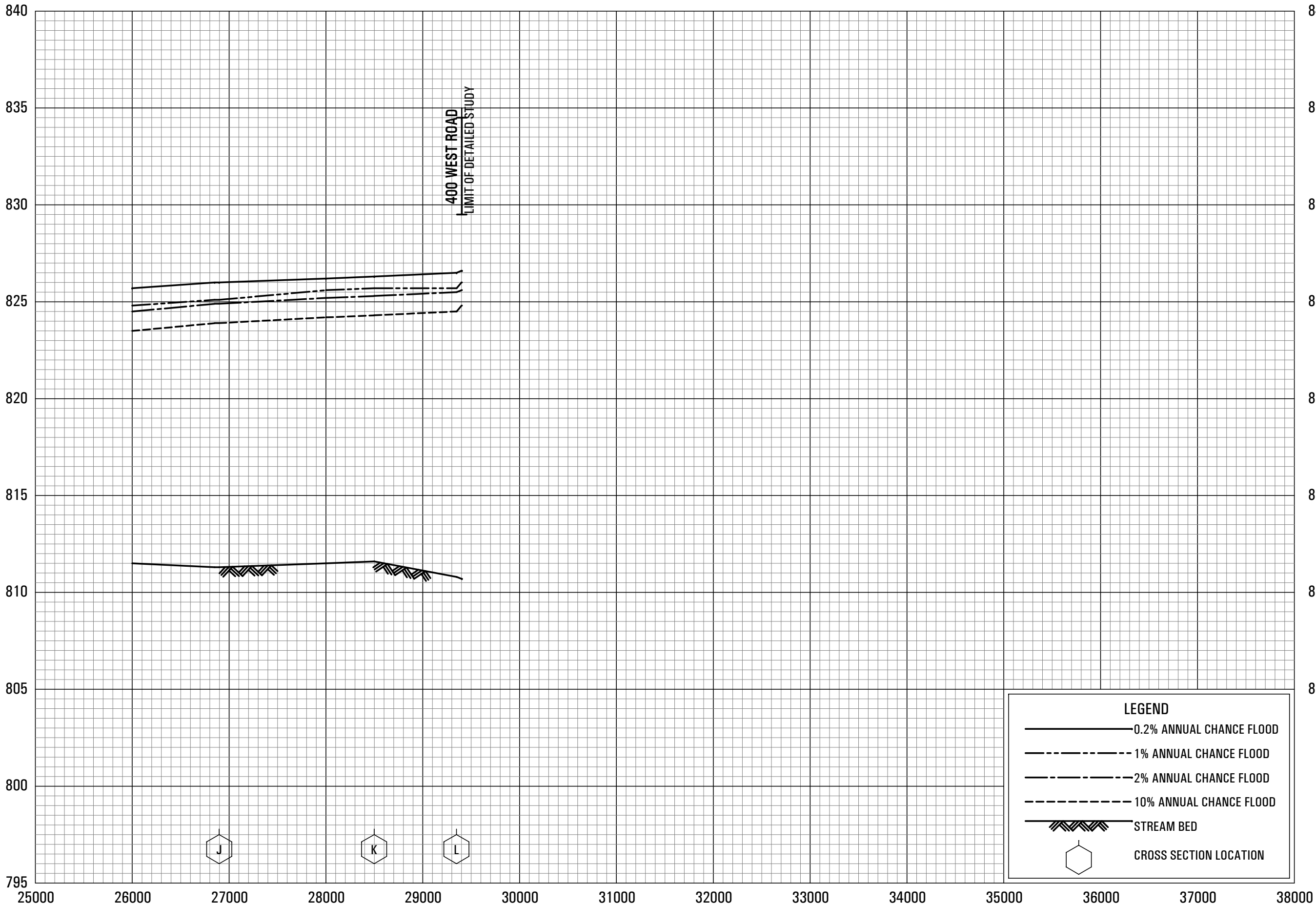


FLOOD PROFILES

WABASH RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
ADAMS COUNTY, IN
AND INCORPORATED AREAS

ELEVATION IN FEET (NAVD 88)



LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

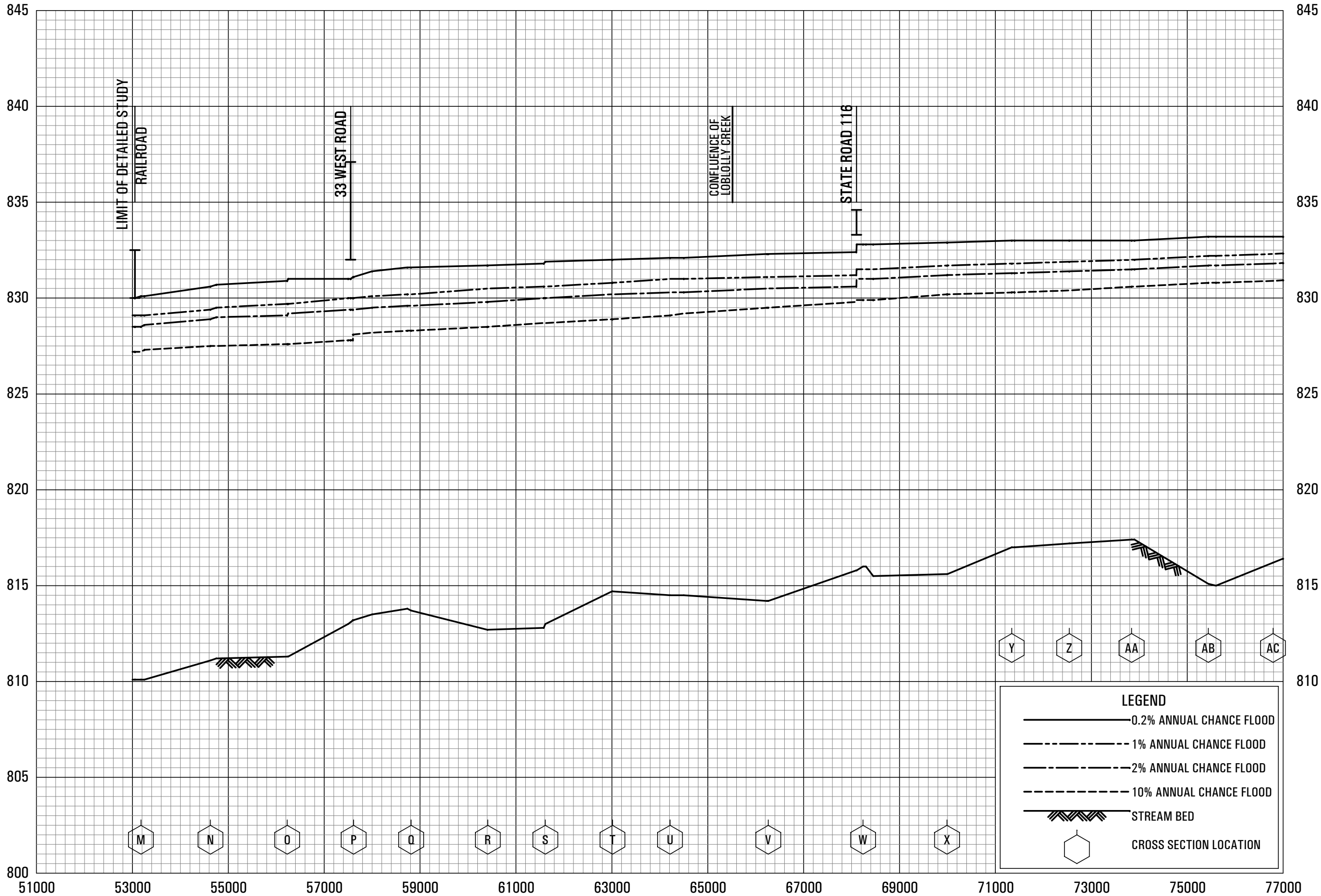
CROSS SECTION LOCATION

FLOOD PROFILES

WABASH RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
ADAMS COUNTY, IN
AND INCORPORATED AREAS

ELEVATION IN FEET (NAVD 88)

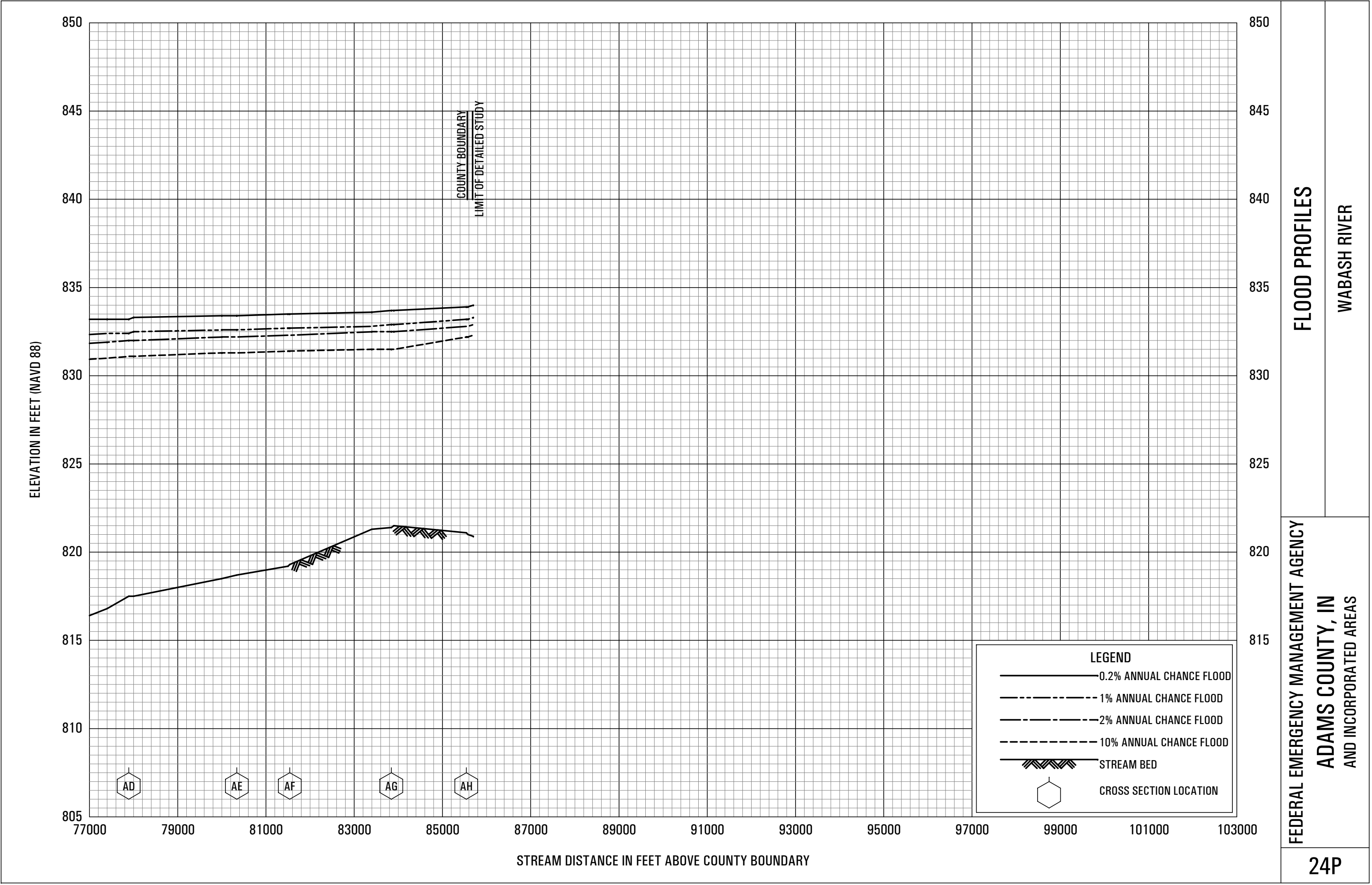


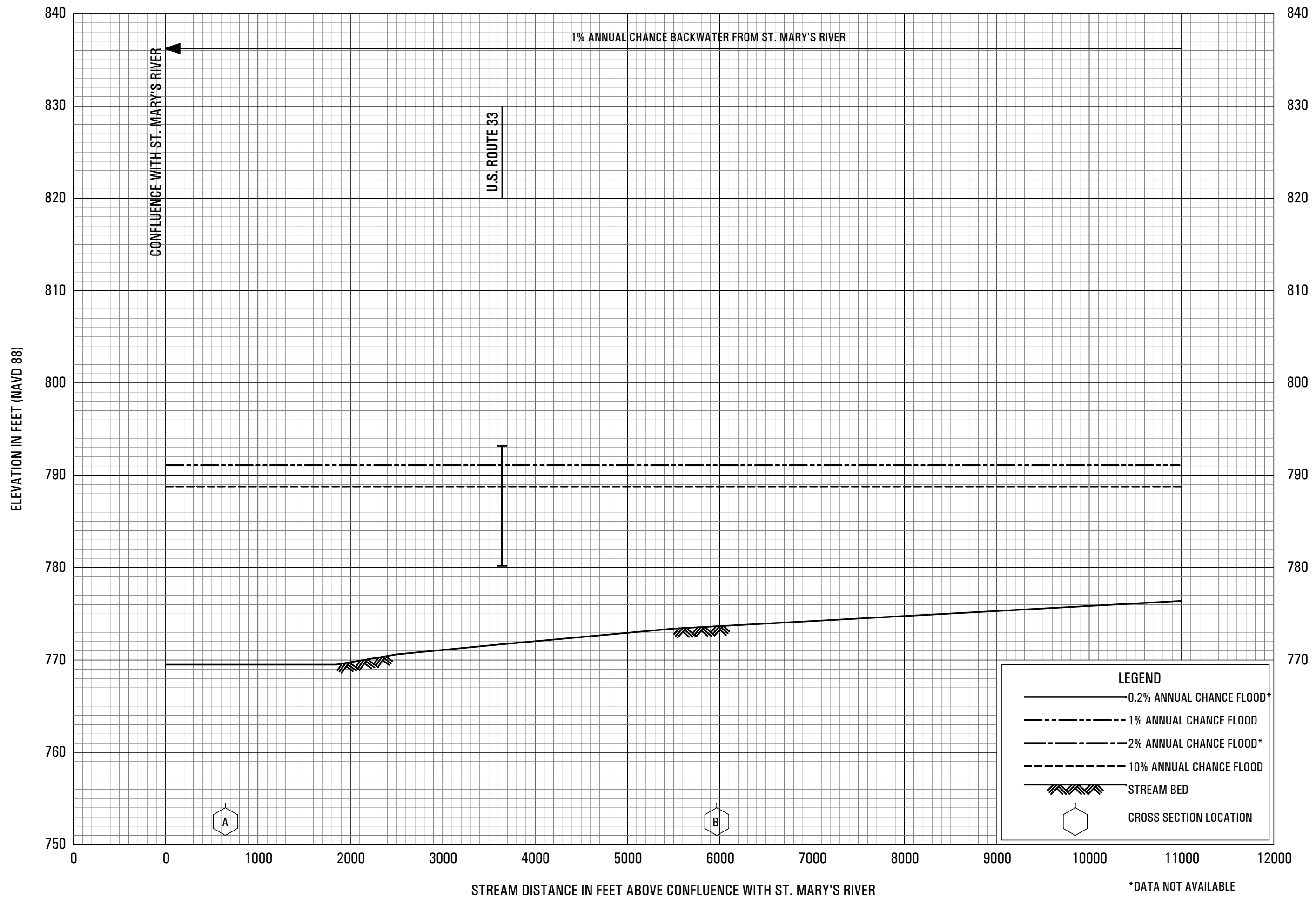
FLOOD PROFILES

WABASH RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ADAMS COUNTY, IN
AND INCORPORATED AREAS





25P	FEDERAL EMERGENCY MANAGEMENT AGENCY ADAMS COUNTY, IN AND INCORPORATED AREAS
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FLOOD PROFILES

YELLOW CREEK

